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TOXIC TORT LITIGATION AND THE CAUSATION ELEMENT: IS THERE ANY HOPE OF RECONCILIATION?

by

Ora Fred Harris, Jr.*

[T]his new kind of harm fails to fit into the mold of a traditional common law tort. Rules and causes of action that developed from traditional, individualized wrongs do not allow recovery by toxic waste victims.¹

THE above view quite adequately places in proper perspective the dilemma that has surfaced today in trying to reconcile the hitherto little understood toxic or hazardous waste exposure injury² with the principles and goals underlying traditional common law tort liability. The singular nature of a toxic tort injury with its inherent problems of latency and causal indeterminacy³ wreaks havoc with establishing the fault of a specific individual or corporate entity and presents well-nigh insuperable problems in demonstrating the requisite causal relationship between exposure to a hazardous waste or toxic substance and a victim's subsequent injury.⁴ In view

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1. Note, *The Inapplicability of Traditional Tort Analysis to Environmental Risks: The Example of Toxic Waste Pollution Victim Compensation*, 35 STAN. L. REV. 575, 580 (1983).

2. A vast amount of scientific uncertainty envelops the question of the manifestation of injuries resulting from exposure to hazardous waste or toxic substances. See, e.g., Note, *Tort Actions for Cancer: Deterrence, Compensation, and Environmental Carcinogenesis*, 90 YALE L.J. 840, 840 (1981) (in the case of cancer, a dreaded, widely researched disease, the actual etiology is scientifically uncertain).

3. See Estep, *Radiation Injuries and Statistics: The Need for a New Approach to Injury Litigation*, 59 MICH. L. REV. 259, 262 (1960).

When the onset of the disease or injury is latent (delayed), predictions of future incidence are based on statistical possibilities. When, in addition, the biological causal relationship also is non-specific (it may be caused by radiation but also arises among unexposed groups and no differentiation between those cases caused by radiation and those caused otherwise is possible), the legal problems, difficult before, become unmanageable under existing rules.

Id.; see also Elliott, *Goal Analysis Versus Institutional Analysis of Toxic Compensation Systems*, 73 GEO. L.J. 1357, 1372 (1985) (problem is not only scientific uncertainty but also sheer number of small contributors to total risk so that matching particular exposures to particular diseases is impractical).

4. Zazzali & Grad, *Hazardous Wastes: New Rights and Remedies?*, 13 SETON HALL L. REV. 446, 457 (1983) (proof of causation is a major recurring issue). Yet, in view of the

of this untenable situation, questions regarding the prudence of reforming the traditional tort liability system to make it responsive to the peculiar demands of this "new" toxic tort have arisen. These modifications have been examined from a policy,⁵ an economic,⁶ and even an insurance point of view.⁷

This Article focuses primarily upon the possible ramifications that any tinkering with the current tort system may have on the venerable policy objectives of tort law: compensation, deterrence, and corrective justice.⁸ In this connection, this Article basically presents an analysis of some possible adjustments to the causation element, the satisfaction of which is normally a condition precedent for recovery under any of the commonly recognized tort theories such as negligence, nuisance, trespass, strict liability, or strict products liability.⁹ The inquiry is aimed at formulating a thesis of causation that will augment the toxic waste exposure victim's chances of compensation and will, at the same time, foster the fulfillment of the other two traditional objectives of tort law, deterrence and corrective justice.¹⁰ Through this process the Article attempts to develop a causation theory that is consistent with the dynamics of modern toxic tort litigation.¹¹ Moreover, the Article offers and explores a proposal regarding the proper forum and scheme for interposing this causation model into toxic tort cases.

proliferation in toxic tort complaints within the last few years, "this may be the area of a litigation explosion in the near future." Knepper, *Review of Recent Tort Trends*, 34 DEF. L.J. 1, 2 (1985); see Moore, *Barrage of Private Tort Claims Simmer Beneath Toxic Dumps*, Legal Times, Oct. 22, 1984, at 1, col. 3.

5. From a policy perspective, the paramount concern underlying the impetus for reform in the field of toxic torts is to increase the chances that the innocent exposure victim will recover. Secondary, but important, considerations are deterrence, or risk reduction, and corrective justice among the parties. Thus, tort reform in this area is wedded to traditional tort objectives. *But see* Note, *supra* note 1, at 575 (most tort reform proposals meet only one of these tort objectives, compensation).

6. See Rosenberg, *The Causal Connection in Mass Exposure Cases: A "Public Law" Vision of the Tort System*, 97 HARV. L. REV. 851 (1984).

7. See Schmalz, *Superfunds and Tort Law Reforms—Are They Insurable?*, 38 BUS. LAW. 175, 175 (1982) (federal statute is only viable method of achieving kind and scope of tort law reforms likely to remain insurable in private markets); Note, *Insurance and Its Role in the Struggle Between Protecting Pollution Victims and the Producers of Pollution*, 31 DRAKE L. REV. 913, 926 (1981) (inability to compensate pollution victims, either under insurance policies or tort law, lies within present tort law system).

8. Note, *supra* note 1, at 575.

9. See Note, *An Analysis of Common Law and Statutory Remedies for Hazardous Waste Injuries*, 12 RUTGERS L.J. 117, 124 (1980) (each theory of recovery has difficulty of proving that defendant's conduct was cause of plaintiff's injuries). For juries, causation is the only liability issue. Weinstein, *The Role of the Court in Toxic Tort Litigation*, 73 GEO. L.J. 1389, 1389 (1985).

10. Any changes should not be made in a vacuum but with the potential effects, if any, upon traditional tort objectives in mind. Before any of these new theories of victim compensation deserve labeling as a recovery in tort, their capacity to attain venerable tort goals should be closely assessed. *But see* Mashaw, *A Comment on Causation, Law Reform, and Guerrilla Warfare*, 73 GEO. L.J. 1393, 1394-95 (1985) (author castigates traditional tort process because it provides neither deterrence nor adequate compensation).

11. Unlike many commentaries on this subject, this Article attempts to explore in greater detail the synergistic relationship of law and science in unmasking and resolving the problems attendant to proving causation in toxic tort litigation.

I. HISTORICAL BACKGROUND OF THEORIES OF RECOVERY FOR TOXIC OR HAZARDOUS EXPOSURE INJURIES: THE CAUSATION PROBLEM

Within the pale of traditional tort liability analysis four theories readily come to mind when considering the possible avenues available for toxic or hazardous waste exposure victims to recover damages for their injuries. These actions may be grounded upon nuisance, trespass, negligence, strict liability or strict products liability.¹² Each theory is fraught with difficulty in the toxic tort context for a number of reasons;¹³ most notably, the causation component of each theory of action is a common conundrum.

Regardless of the theory of recovery employed, the exposure victim has to establish, with varying degrees of difficulty, that the defendant's conduct was a cause-in-fact of the plaintiff's injury.¹⁴ The plaintiff must demonstrate cause-in-fact on a more probable than not basis, that is, the plaintiff must show a probability of causation in excess of fifty percent.¹⁵ Furthermore, the cause-in-fact must comport with either the "but for" test or the "substantial factor" test.¹⁶ The plaintiff must prove by the preponderance of the evidence that "but for" the defendant's conduct, the plaintiff would not have been injured or, alternatively, that the defendant's conduct was a substantial factor in bringing about the plaintiff's injury.¹⁷ The common law thus requires that the plaintiff establish causation with reasonable certainty and specificity; should the plaintiff fail to do so by the greater probability, he or she will recover no recompense for any injuries.¹⁸

12. Another theory conceivably implicated in these circumstances is tortious misrepresentation. See *Starling v. Seaboard Coast Line R.R.*, 533 F. Supp. 183, 192 (S.D. Ga. 1982) (fraud claim in connection with exposure to asbestos).

13. For an illuminating discussion of the proof problems attendant to trespass, nuisance, negligence, and strict liability see Note, *supra* note 9, at 122-38. Because strict liability dispenses with the requirement of proving fault, it is championed by some commentators as a progressive approach to adopt in toxic tort liability cases. See *id.* at 129-31.

14. The causation-in-fact element scrutinized in this Article should not be confused with the concept of proximate cause, which has nothing to do with causal relationship, but is simply a policy-based concept used to keep the scope of tort liability within reasonable bounds. Causation-in-fact (hereinafter interchangeably used with the word "causation") concerns, for the most part, the factual relationship between cause and effect. See Malone, *Ruminations on Cause-in-Fact*, 9 STAN. L. REV. 60, 60 (1956). Another commentator has added a third distinct component to the causation formula: causal link. Calabresi, *Concerning Cause and the Law of Torts: An Essay to Henry Kalven, Jr.*, 43 U. CHI. L. REV. 69, 71 (1975).

15. Rosenberg, *supra* note 6, at 858.

16. See W. PROSSER & W. KEETON, *HANDBOOK OF THE LAW OF TORTS* § 41, at 267-68 (5th ed. 1984) [hereinafter cited as PROSSER] (author applauds comparative superiority of "substantial factor" test).

17. Quite frankly, in most factual circumstances, both tests are likely to produce the same results. Any act that was a "but for" cause was probably also a "substantial factor" in bringing about a particular result. See *id.* A notable exception may be those situations involving concurrent causes, either of which alone could have produced the result. The "but for" test is probably inappropriate in such situations. *Id.* § 41, at 239; see *Anderson v. Minneapolis, St. P. & S. Ste. M. Ry.*, 146 Minn. 430, 179 N.W. 45 (1920) (two merging fires, one of unknown origin; only the substantial factor test was appropriate).

18. Those critics of the traditional common law rules concerning causation understandably have questioned whether the rules promote the venerable tort goals of compensation (the plaintiff may receive absolutely nothing for his or her injuries because of the all-or-nothing

Causation problems are greatly compounded when applied to the field of toxic or hazardous exposure injury. A common, generally accurate, evaluation of humankind's understanding of the behavior of hazardous or toxic wastes and the effect of exposure on humans points to a vast amount of scientific uncertainty.¹⁹ This uncertainty is understandable given that many of these issues are at the very frontiers of science.²⁰ Thus, a plaintiff attempting to establish that exposure to a particular substance has in fact caused his or her injury may face a dubious court or jury because of the lack of scientific certainty.²¹ Moreover, because this "new" tort injury can have a latency period²² of up to as many as twenty to thirty years, it may be, as a practical matter, virtually impossible to establish the requisite causal relationship between an exposure that may have taken place many decades ago and a recently manifested injury now claimed to be the consequence of that exposure.²³ Not only does this long latency period stymie the toxic or hazardous exposure victim's ability to isolate the alleged substance that precipitated the injury, it also diminishes the chances of identifying the responsible parties.²⁴ These two requirements are critical if an injured plaintiff is to establish causation successfully in a toxic tort case. Because of this latency phenomenon and the causal indeterminacy that it spawns, traditional tort liability principles, which generally impose upon the plaintiff the burden of proving causation-in-fact by a preponderance of the evidence, simply serve as an impregnable barrier to recovery by an exposure victim. Stated more bluntly, traditional tort rules and analyses concerning causation are perhaps out of place when applied to toxic tort litigation.²⁵

preponderance approach), deterrence (the defendant may be able to externalize all the costs of his tortious acts), and corrective justice (discerning any justice between the parties is difficult when a tortfeasor is allowed to shift the entire loss stemming from his or her conduct to the shoulders of the innocent injured party). See Rosenberg, *supra* note 6, at 855-59.

19. See, e.g., Trauberman, *Statutory Reform of "Toxic Torts": Relieving Legal, Scientific, and Economic Burdens on the Chemical Victim*, 7 HARV. L. REV. 177, 197-200 (1983); Note, *The Burden of Proof in Environmental and Public Health Litigation*, 49 UMKC L. REV. 207, 208 (1981) [hereinafter cited as Note, *The Burden of Proof*]; Note, *Toxic Substance Contamination: The Risk-Benefit Approach to Causation Analysis*, 14 U. MICH. J.L. REF. 53, 53 (1980) [hereinafter cited as Note, *Toxic Substance Contamination*].

20. See *United States v. Vertac Chem. Corp.*, 489 F. Supp. 870, 881 (E.D. Ark. 1980) (a dioxin case).

21. See *Johnson v. Tipton*, 103 Ill. App. 3d 291, 431 N.E.2d 464 (1982).

22. Latency period means the interval between the time one is exposed to a toxic substance or hazardous waste and the time that an injury or disease manifests itself.

23. See, e.g., McElveen & Eddy, *Cancer and Toxic Substances: The Problem of Causation and the Use of Epidemiology*, 33 CLEV. ST. L. REV. 29, 39-43 (1984); Rosenberg, *supra* note 6, at 855-59; Note, *Personal Injury Hazardous Waste Litigation: A Proposal for Tort Reform*, 10 B.C. ENVTL. AFF. L. REV. 797, 827-31 (1982).

24. The responsible party, for example, may be unidentifiable because of the number of generators that may have used a particular waste site, all disposing of similar, if not identical, toxic or hazardous wastes. Moreover, the ownership and operation of these waste sites generally changes quite rapidly, making assignment of blame to any specific individual, group of individuals, or legal entity extremely difficult. See Note, *Proving Causation in Toxic Torts Litigation*, 11 HOFSTRA L. REV. 1299, 1301 (1983). "The burden of identifying the responsible party can be an impossible one to meet." *Id.*

25. See Note, *supra* note 1, at 580.

II. THE RISK OF EXPOSURE TO TOXIC SUBSTANCES OR HAZARDOUS WASTES

A. *The Nature and Extent of the Risk*

As the United States continues to develop economically, striking a proper balance between economic output and the quality of the environment becomes more profoundly significant.²⁶ Most, if not all, Americans want a better standard of living; yet, this desire may require a trade-off in regard to maintaining a healthy environment.²⁷ For example, a socially beneficial manufacturing or chemical process, which produces highly useful products and provides employment for a substantial number of people, may generate as a by-product a vast amount of toxic substances or hazardous wastes,²⁸ which may pose a significant threat to human health and the environment. Moreover, these toxic substances or hazardous wastes may be disposed of improperly,²⁹ thus exacerbating the risk of harm.³⁰ To assist in comprehending the magnitude of the danger involved, note that "[e]xperts estimate that of the approximately 50,000 hazardous waste disposal sites in the country, between 1300 and 34,000 sites contain substantial amounts of hazardous wastes which could damage human health or the environment."³¹

With a human exposure risk problem of such mammoth proportions, the improper disposal of toxic and hazardous wastes is a national public health problem.³² This unpalatable situation costs the nation not only in environmental terms, but tends to drain our economic resources as well. A prime example of the massive economic investment that has been made in managing and controlling hazardous waste sites is the Superfund program.³³ In this program Congress originally committed \$1.6 billion for the emergency cleanup of hazardous waste sites whose actual or threatened releases create

26. The balancing of these countervailing considerations is always a major underpinning of environmental regulation and decision-making. See T. SCHOENBAUM, ENVIRONMENTAL POLICY LAW 59-60 (1985).

27. *Id.* at 60 ("people argue that environmental disruption must be tolerated as a 'trade-off' to progress"). The Resource Conservation and Recovery Act, 42 U.S.C. § 6901(a)(2) (1982) states that:

[T]he economic and population growth of our Nation, and the improvements in the standard of living enjoyed by our population, have required increased industrial production to meet our needs, and have made necessary the demolition of old buildings, the construction of new buildings, and the provision of highways and other avenues of transportation, which, together with related industrial, commercial, and agricultural operations, have resulted in a rising tide of scrap, discarded, and waste materials.

28. One commentator noted that "[e]very year millions of tons of hazardous wastes are discarded into the environment." Note, *supra* note 23, at 797.

29. *Id.* at 798.

30. "Perhaps 90 percent of these hazardous wastes, or 41 million tons, is being disposed of improperly." Goldfarb, *The Hazards of Our Hazardous Waste Policy*, 19 NAT. RESOURCES J. 249, 251 (1979).

31. Note, *supra* note 23, at 798.

32. For example, the etiology of "from 70 to 90 percent of all cancers" is said to be environmental factors. *Id.*

33. See Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9657 (1982) [hereinafter referred to as Superfund or CERCLA]. For a discussion of clean-up costs see Annot., 70 A.L.R. FED. 329 (1984).

an imminent and substantial danger to human health and the environment.³⁴ In addition, staggering amounts of money have been expended in connection with administering and enforcing the various federal environmental statutes.³⁵

To date, this massive environmental threat and the concomitant economic commitment to counteract it show no sign of waning.³⁶ The most practical goal may be simply to stabilize the danger at its present level through the stringent enforcement of federal, and perhaps state,³⁷ environmental laws.

34. 42 U.S.C. §§ 9631-9633 (1982). Taxes on petroleum and certain chemicals initially comprised 85% of the fund, while penalties, certain amounts collected under the Federal Water Pollution Control Act, and Treasury appropriations comprise the remaining amount. *Id.* § 9631. \$1.6 billion seemed grossly inadequate to deal effectively with the colossal problem of cleaning up hazardous waste sites. Recent proposals concerning reauthorization called for a Superfund of up to \$10 billion, an amount palpably more reasonable than the \$1.6 billion figure. See *House Passes Superfund Reauthorization*, THE WEEK IN CONGRESS, CONG. INDEX (CCH) (Dec. 13, 1985). An impasse developed, however, that threatened any meaningful congressional action, primarily because the Senate insisted upon a \$7.5 billion Superfund program and partial funding of the program by a manufacturers' excise tax. *Budget Bill Stalls Adjournment*, THE WEEK IN CONGRESS, CONG. INDEX (CCH) (Dec. 20, 1985). As a result, final "action [remained] uncertain because of the difficulties conference committee members [had] in resolving differences between the House and Senate Bills." Dombrowski, *Who Will Pay Hazardous Cleanup Bill?*, MGMT. OF WORLD WASTE, Feb. 1986, at 42. On October 2, 1986, however, House and Senate conferees agreed on a \$9 billion, five-year Superfund program. Hanlon, *Superfund Reauthorization Compromise Includes Oil Import Fee*, 33 TAX NOTES, Oct. 6, 1986, at 13. "The majority of the revenues would come from a substantial increase in the Superfund petroleum taxes, combined with a broad-based tax on manufacturers. The conferees reimposed the prior law petroleum feedstock taxes . . ." *Id.* In addition general revenues and "interest and cost recoveries from polluters" would be funding sources. *Id.*

Prompt passage of the compromise legislation by both the House and the Senate occurred notwithstanding a threatened veto by the President because of the broad-based taxes on petroleum and the corporate earnings of the manufacturing sector. See *House Passes \$9 Billion Superfund*, CINCINNATI ENQUIRER, Oct. 9, 1986, at A1, col. 1; *Senate Dares Reagan in Superfund Approval*, CINCINNATI ENQUIRER, Oct. 4, 1986, at A3, col. 1. Despite his threats of veto, the President signed the Superfund legislation into law stating, "[t]he bill's financing has real concerns, but the health and safety of Americans are among the highest priorities of government . . ." *Cleanup Fund Gets \$9 Billion*, CINCINNATI ENQUIRER, Oct. 18, 1986, at A3, col. 1.

35. See *infra* notes 40-46 and accompanying text.

36. See Karien, *Pollution: Now the Bad News*, NEWSWEEK, Apr. 8, 1985, at 26. The article chronicles three reports that reflect the dire level of pollution extant today:

One, a congressional survey, indicated that toxic chemicals are being emitted into the air in more places—and in higher quantities—than ever suspected. Another, from the World Resources Institute, revealed data showing that acid rain poses a threat not just to the Eastern Seaboard, but to millions of acres of Western wilderness and timberlands as well. And a third survey, this one from previously undisclosed Public Health Service records, listed 1,484 sites that have been closed or restricted because of toxic contamination so severe that they threaten human health.

Id. Specifically, in connection with Superfund, "Only about 600 of the 20,000 dump sites in America are on the NPL [National Priority List, a toxic waste clean-up priority list authorized under Superfund]. Consequently, potential defendants responsible for the wastes on non-NPL sites can be fairly certain that the government will be unlikely to begin removal at these sites for many years, if ever." Seng, *The Quasi-Contractual Nature of Cost-Recovery Actions Under CERCLA*, 5 VA. J. NAT. RESOURCES L. 85, 175 (1985) (footnote omitted).

37. See, e.g., ALASKA STAT. § 46.03.822 (1982) (victim compensation on strict liability standard); Hazardous Substance Account Act of 1981, CAL. HEALTH & SAFETY CODE §§ 25186, 25300-25395 (West 1984) (also known as the California Superfund); FLA. STAT. ANN. § 376.12 (West Supp. 1981) (Oil Spill Prevention and Pollution Control Act applies to damage payment from nonhazardous spills to vessel or land); MASS. GEN. LAWS ANN. ch.

Given this situation, the future threat of environmental harm is potentially as great, or perhaps even greater, than the menace is today.³⁸

B. Available Means of Reducing the Risk

The most publicized efforts to abate the risk of harm from human exposure to toxic substances or hazardous wastes have been spawned in the public sector at the federal legislative level.³⁹ Of the environmental statutes that Congress has enacted, those of special importance in controlling toxic substances or hazardous wastes are: (1) the Resource Conservation and Recovery Act;⁴⁰ (2) the Federal Insecticide, Fungicide, and Rodenticide Act;⁴¹ (3) the Safe Drinking Water Act;⁴² (4) the Federal Water Pollution Control Act;⁴³ (5) the Clean Air Act;⁴⁴ (6) the Toxic Substances Control Act;⁴⁵ and, as previously noted, (7) the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund).⁴⁶ All of these federal statutory responses constitute a laudable effort to alleviate the environmental degradation problem. Their cardinal deficiency, however, is that they do not provide any form of victim compensation for injuries arising from the improper disposal of toxic substances or hazardous wastes.⁴⁷ This flaw is a significant part of the toxic tort victim's dilemma.⁴⁸

1. Federal Laws

a. *The Resource Conservation and Recovery Act (RCRA).* Although perhaps inappropriately named,⁴⁹ RCRA plays an integral role in the federal

214, § 7A (West 1981) (10 or more Massachusetts citizens can seek injunction for state/local environmental law violations).

38. This bleak forecast is based on information reflecting an increasingly severe problem with no apparent signs of curtailment. See U.S. GEN. ACCOUNTING OFFICE, DELAYS IN SETTING WORKPLACE STANDARDS FOR CANCER-CAUSING DANGEROUS CHEMICALS 9 (1977), cited in Trauberman, *supra* note 19, at 179 n.3; Note, *Causation in Acid Rain Litigation: Facilitating Proof with Joint Liability Theories*, 1983 B.Y.U. L. REV. 657, 657-59 [hereinafter cited as Note, *Causation*]; Note, *supra* note 24, at 1299-300.

39. The commerce clause of the Constitution, U.S. CONST. art. I, § 8, provides Congress's authority for enacting the various federal environmental statutes.

40. 42 U.S.C. §§ 6901-6987 (1982).

41. 7 U.S.C. §§ 136, 136a-136y (1982).

42. 42 U.S.C. §§ 300f-300j (1982).

43. 33 U.S.C. §§ 1251-1376 (1982).

44. 42 U.S.C. §§ 7401-7642 (1982).

45. 15 U.S.C. §§ 2601-2629 (1982).

46. 42 U.S.C. §§ 9601-9657 (1982, as amended 1986).

47. Some response costs are available to governmental units and individuals for removal and remedial action and related expenses under the Superfund legislation, but they are extremely limited and fall far short of being a meaningful form of compensatory relief. 42 U.S.C. § 9611(a)(1)-(2) (1982). Medical expenses and property damages, for example, are not recoverable as response costs. Note, *supra* note 23, at 806.

48. Congress has not responded very sympathetically to the plight of the toxic tort exposure victim. For example, Congress has spurned repeated attempts to include a victim compensation provision in Superfund. Some, however, remain optimistic that victim compensation will soon come to fruition. Address by J. William Futrell, Hazardous Wastes, Superfund and Toxic Substances Conference (Nov. 1, 1985).

49. Although RCRA does relate to natural resource conservation and recovery, the overarching concern of the Act "is the effect on the population and the environment of the disposal

government's assault on hazardous waste disposal. The Act prevents the discarding of hazardous wastes under circumstances that create an imminent and substantial endangerment to human health and the environment.⁵⁰ Key components of this proscription are "imminent" (the statute does not prohibit a consummate danger)⁵¹ and "substantial," which requires a balancing process, weighing the benefits against the costs.⁵²

Apart from the overall prohibition against discarding hazardous wastes in manners posing threats to health and the environment, the mechanism that plays a prominent role in fostering the objectives of RCRA is what is commonly referred to as the "cradle-to-grave" requirements.⁵³ These provisions prescribe rather stringent conditions under which hazardous waste is to be handled from the generator to the transporter and eventually to the disposal facility.⁵⁴ Once hazardous wastes leave the site of generation, handlers, through a manifest system, account for the wastes throughout the disposal process. The generator must initiate the manifest, fully describing the nature and qualities of the waste;⁵⁵ the transporter must then sign the manifest reflecting what material the generator has entrusted to him;⁵⁶ finally, the disposer must execute the manifest to reflect the nature and qualities of waste that he actually accepts for disposal.⁵⁷ To be sure, the cradle-to-grave provisions serve a laudable purpose and, if followed, engender an accounting system for hazardous waste disposal that should greatly alleviate the risks attendant to this activity.⁵⁸

of discarded hazardous wastes—those which by virtue of their composition or longevity are harmful, toxic or lethal." H.R. REP. NO. 1491, 94th Cong., 2d Sess. 3, *reprinted in* 1976 U.S. CODE CONG. & AD. NEWS 6238, 6241 (1976).

50. 42 U.S.C. § 6973 (1982).

51. The court alluded to the imminent and substantial endangerment requirement in *United States v. Vertac Chem. Corp.*, 489 F. Supp. 870, 885 (E.D. Ark. 1980).

52. *See Reserve Mining Co. v. EPA*, 514 F.2d 492, 537-38 (8th Cir. 1975).

53. 42 U.S.C. §§ 6921-6926 (1982).

54. *Id.*

55. *Id.* § 6922(5). This statutory requirement applies only to off-site disposal of hazardous wastes. *Id.*

56. *Id.* § 6923(a)(3), (4).

57. *Id.* § 6924(2). Moreover, the EPA must properly issue a permit to disposal facilities before the facilities can operate lawfully. *Id.* § 6925(a).

58. Unfortunately, the hazardous waste disposal approach mandated in RCRA is ignored much too often. Nightmarish stories of clandestine midnight disposals of hazardous or toxic wastes in unapproved areas are common. *See EPA Summary of Removal Actions at Hazardous Waste Sites Under Superfund Law*, 14 ENV'T REP. (BNA) 13561 (Nov. 18, 1983) (contaminants discovered in containers on beach in Laguna Beach, California; midnight dumping of PCBs in Baldwin, Florida; abandoned drum found in stream in East St. Louis, Illinois; corrosive chemicals in drums illegally dumped at truck stop in Jackson, Mississippi).

The Environmental Protection Agency says that at least 14,000 illegal dump sites pose fire hazards, threaten groundwater, or emit fumes. And many environmentalists say that figure is low. U.S. industries generate 88 billion pounds of toxic waste a year, they claim, and 90 percent of that has been improperly disposed of.

Smith, *Midnight Dumping*, 6 OMNI, Mar. 1984, at 116; *see* Miller & Miller, *The Midnight Dumpers*, USA TODAY, Mar. 1985, at 61, 62 (only a matter of time before toxic time bombs explode). The FBI is making a feeble effort to crackdown on midnight dumping. Note, *The Role of Injunctive Relief and Settlements in Superfund Enforcement*, 68 CORNELL L. REV. 706, 708 n.18 (1983).

Although RCRA is a significant spoke in the environmental protection wheel, the Act provides no method for a toxic or hazardous exposure victim to recover monetary damages for injuries suffered. First, the proscription in the Act is against imminent endangerments; the risk that causes an exposure victim's injuries has already materialized. Second, beyond the substantive violation question, RCRA is inadequate remedially. Basically, the remedy available under the Act is injunctive in nature. Since injunctions are a form of equitable, not legal, relief, they simply terminate the offensive activity and do not place monetary compensation in the hands of an injured party.

b. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA was enacted to impede the risk of harm emanating from the improper use and disposal of pesticides.⁵⁹ Its most noteworthy feature is the provision that requires registration of pesticides with the EPA prior to their use. To be eligible for registration the pesticide must not, in the determination of the EPA, have the capability of creating unreasonable adverse effects on the environment.⁶⁰ If a pesticide fails this criterion, its use will not be authorized.⁶¹

Facially, FIFRA seems to offer significant protection from toxic or hazardous exposure injury. Here again, however, the available remedy does not embrace victim compensation.⁶² More significantly, FIFRA has failed miserably in terms of meeting its substantive goals. Very few pesticides have been properly registered since FIFRA's enactment,⁶³ and, consequently, environmental dangers remain unchecked. Thus, FIFRA, in practice, has offered little in the way of curbing the unreasonable risk of injury arising from exposure to toxic or hazardous pesticides.⁶⁴

59. See 7 U.S.C. §§ 136, 136a-136y (1982).

60. *Id.* § 136a(a) (5). Too many pesticides remain unregistered. W. RODGERS, ENVIRONMENTAL LAW 857 (1977). Bureaucratic uncertainty has "resulted in a great deal of controversy holding up the registration of several pesticides." *Id.* at 863. Notably, the agricultural use of pesticides is one of the prime sources of water pollution. R. FINDLEY & D. FARBER, ENVIRONMENTAL LAW IN A NUTSHELL 99 (1983). Thus, exposure to water contaminated by pesticides may cause hazardous or toxic exposure injuries.

61. 7 U.S.C. § 136a(c)(6) (1982). On paper, FIFRA looks good. In practice, however, the results have been different. Some now consider the Act an unmitigated disaster. Address by A. Alm, Environmental Law Conference (Feb. 23, 1984). This condemnation has raised strong doubts about the likelihood of the Act's reauthorization. *Id.* Legislative activity in this area was evident, however, as recently as the spring of 1986. See Davis, *Panel Slogs Through Markup of New Pesticide Legislation*, CONG. Q., June 14, 1986, at 1370.

62. As noted earlier, this omission is a common shortcoming of the various federal environmental statutes. Enforcement actions generally grounded upon the power of injunction are the ordinary means of relief. See Note, *The Burden of Proof*, *supra* note 19, at 210-11; see also Note, *Developments in Victim Compensation Legislation: A Look Beyond the Superfund Act of 1980*, 10 COLUM. J. ENVTL. L. 271, 271 (1985) [hereinafter cited as Note, *Developments*] (problem of absence of effective system of victim compensation for injuries caused by exposure to toxic chemicals has recently received increased attention).

63. "Approximately 45,000 pesticide products are currently marketed in the United States. The Environmental Protection Agency (EPA) regulates these products primarily on the basis of their pesticidal active ingredients. There are roughly 1,400 'active ingredients' in the 45,000 products now on the market." U.S. ENVTL. PROTECTION AGENCY, PESTICIDES FACT BOOK 1 (1986).

64. Note, *David's Copperfield and FIFRA's Labelling Misadventures*, 4 NOVA L.J. 107,

c. *The Safe Drinking Water Act.* The contamination of existing potable water supplies by toxic substances or hazardous wastes is one of the most serious forms of environmental pollution extant today.⁶⁵ Groundwater is a primary water source that is frequently threatened by the leaching of improperly disposed toxic substances or hazardous wastes.⁶⁶ This subterranean water supply furnishes water in varying percentages, depending on the region of the country, for human and animal consumption, industrial uses, and agricultural purposes.⁶⁷ Moreover, reliance upon groundwater continues to rise steadily as surface water supplies dwindle or become more polluted.

The Safe Drinking Water Act⁶⁸ is one promising statute for groundwater pollution victims.⁶⁹ Basically, the Act interdicts those intrusions into the ground of contaminants that create an imminent endangerment to existent public water supplies.⁷⁰ The only substantive limitation upon the attractiveness of the Safe Drinking Water Act in protecting groundwater is that the Act does not apply to private water supplies⁷¹ such as private wells.⁷² Consequently, those exposed to toxic substances or hazardous wastes because of the contamination of private wells do not have claims that fall under the provisions of the Safe Drinking Water Act.⁷³ At the risk of being tautological, a glaring deficiency of the Safe Drinking Water Act is the absence of a victim compensation provision.⁷⁴ This deficiency does not bode well for a

107 (1980) (EPA's enforcement of FIFRA may create same pesticide pollution problems EPA seeks to prevent).

65. Living organisms, including humans, must have fresh water to sustain life. See 1 U.S. WATER RESOURCES COUNCIL, *THE NATION'S WATER RESOURCES 1975-2000*, at 60, 66 (1979).

66. R. FREEZE & J. CHERRY, *GROUNDWATER* 436 (1978).

67. *Id.* at 6-7 (table 1.2 and figure 1.3), relying on statistics appearing in Murray, *Water Use, Consumption, and Outlook in the U.S. in 1970*, 65 J. AM. WATER WORKS A. 302-08 (1973) (groundwater, less important in industrial usage, provides significant percentage of supply for rural and urban domestic use and irrigation).

68. 42 U.S.C. §§ 300f-300j (1982). The Safe Drinking Water Act was recently amended, and the President signed the amendments on June 19, 1986. See Pub. L. No. 99-339, 100 Stat. 642 (1986). Some of the preeminent provisions of the new legislation are: (1) requiring the EPA to establish national primary drinking water regulations (§ 101); (2) strengthening the EPA's enforcement authority regarding underground injection of hazardous wastes that endanger underground sources of drinking water (§ 202); and (3) initiating a program "to protect critical aquifer protection areas located within areas designated as sole or principal source aquifers" (§ 203).

69. Note, *Toxic Substance Contamination*, *supra* note 19, at 58. The author also lists the Federal Water Pollution Control Act and the RCRA as other promising statutes.

70. Underground waste injections are principal targets of the Safe Drinking Water Act, although the Act proscribes other intrusive acts that endanger the quality of public water supplies as well. See 42 U.S.C. §§ 300f-300j (1982).

71. *Id.* § 300f(4) defines "public water system" as "a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals."

72. Note, *Toxic Substance Contamination*, *supra* note 19, at 58.

73. See *Johnson v. Tipton*, 103 Ill. App. 3d 291, 431 N.E.2d 464, 467 (1982). No cause of action existed under the Safe Drinking Water Act for the contamination of the plaintiff's well. Hence, at no point in this common law toxic tort action was there any mention of the Act.

74. "Most of the imminent hazard provisions limit available relief to immediate injunctions." Note, *Toxic Substance Contamination*, *supra* note 19, at 59.

toxic tort exposure victim who invariably desires some form of compensatory relief for injuries suffered.

d. *The Federal Water Pollution Control Act (Clean Water Act).* The Clean Water Act⁷⁵ is one of the most important federal environmental statutes. The Act is significant to the toxic tort exposure victim because of its provisions proscribing the unauthorized dumping of toxic or hazardous pollutants into surface waters.⁷⁶ A cause of action is available, at least for injunctive relief, under the Act.⁷⁷ The Clean Water Act, however, does not extend to victim compensation, a deficiency common among federal environmental statutes.

Significant sentiment exists that the Clean Water Act does not pertain to the insidious environmental threat of toxic or hazardous waste contamination of groundwater.⁷⁸ At the crux of the problem is whether the term "navigable waters,"⁷⁹ to which the Clean Water Act applies, encompasses groundwater. To date, courts have resolved this issue inconsistently, at least in regard to the injection of hazardous waste into underground wells.⁸⁰ Ironically, one of the most significant environmental statutes may actually be impotent when it comes to addressing one of the most pressing toxic or hazardous exposure problems today.⁸¹

75. 33 U.S.C. §§ 1275-1376 (1982).

76. *See id.* § 1311(a) (discharging pollutants in violation of the applicable effluent limitations is illegal); *see also* Chemical Mfrs. Ass'n v. NRDC, 105 S. Ct. 1102, 84 L. Ed. 2d 90 (1985) (Supreme Court read into statute fundamentally different factor, or FDF, variance for toxic water pollutants).

77. The EPA, when seeking to enjoin such activity, is not completely stymied by scientific uncertainty concerning the toxicity of the pollutant. The statute mandates that the EPA take those actions necessary to provide an "ample margin of safety." 33 U.S.C. § 1317(a)(4) (1982). As a consequence, the EPA, for example, has been able to prohibit successfully the dumping of low chlorinated PCBs into surface waters, although scientific knowledge of possible deleterious effects was virtually limited to more chlorinated PCBs. *See* Environmental Defense Fund v. EPA, 598 F.2d 62, 83-85 (D.C. Cir. 1978).

78. *See* Exxon Corp. v. Train, 554 F.2d 1310, 1329-31 (5th Cir. 1977).

79. Courts have generally been liberal in applying the "navigable waters" criterion, found in 33 U.S.C. § 1251(a)(1) (1982), in connection with surface waters. *See* W. RODGERS, *supra* note 60, § 4.5, at 390 ("[t]he test of navigability is whether the watercourse could be used for commerce, not whether it is used, and this inquiry extends to 'the distant past and extended future'") (citing *United States v. Sunset Cove, Inc.*, 3 ENVTL. L. REP. (ENVTL. L. INST.) 20,370, 20,372 (D.C. Or. 1973), *aff'd in part*, 514 F.2d 1089 (9th Cir. 1975)).

80. *See* Exxon Corp. v. Train, 554 F.2d 1310, 1331 (5th Cir. 1977) (discharges into deep wells exempt); *United States v. GAF Corp.*, 389 F. Supp. 1379, 1383 (S.D. Tex. 1975) (no protection under the Clean Water Act). *But see* *United States Steel Corp. v. Train*, 556 F.2d 822, 852 (7th Cir. 1977) (EPA does have authority). The EPA has not alleviated the problem by asserting jurisdiction in connection with groundwater in terms of § 208 area-wide management. 33 U.S.C. § 1288 (1982); T. SCHOENBAUM, *supra* note 26, at 743.

81. Congress should fill this gap when it reauthorizes the Clean Water Act, an action it is currently debating. Address by Senator Stafford, Hazardous Wastes, Superfund, and Toxic Substances Conference (Oct. 31, 1985). *But see* W. RODGERS, *supra* note 60, § 4.6, at 401 (cases interpreting 1972 amendments to Clean Water Act uniformly reject navigability restrictions). In the Clean Water Act of 1977 "the Act's definition of 'navigable waters' as 'the waters of the United States' makes it clear that the term 'navigable' as used in the Act is of limited import." *United States v. Riverside Bayview Homes, Inc.*, 106 S. Ct. 455, 462, 88 L. Ed. 2d 419, 430 (1985). *But see* *Reagan Vetoes Water Bill*, Cincinnati Enquirer, Nov. 7, 1986,

e. *The Toxic Substances Control Act (TOSCA)*. Of all the federal environmental statutes TOSCA⁸² provides the most comprehensive regulation of toxic substances, most notably industrial chemicals. The Act proscribes those toxic substances that create an unreasonable risk of harm or injury to health and the environment.⁸³ One should underscore "unreasonable" in describing the unacceptable risk embraced by the language of the statute. This all important determination of reasonableness often involves balancing competing interests in a manner similar to that used in nuisance cases.⁸⁴ The gravity of the harm threatened must overshadow the social utility of the activity producing the injury before courts will deem the risk unreasonable and thus invoke the statute.⁸⁵

Even though a court may determine that a chemical creates an unreasonable risk, the statute is simply regulatory;⁸⁶ its violation does not entitle the victim to any form of compensatory damages.⁸⁷ Here again, a federal environmental statute's inutility to the toxic substance or hazardous waste exposure victim is painfully evident.⁸⁸

f. *The Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)*.⁸⁹ Superfund is primarily designed to provide the EPA with authority and resources to clean up the worst of the increasing

at A18, col. 1 (citing costs, President pocket vetoed clean Water Amendments Act of 1986 on Nov. 6, 1986).

82. 15 U.S.C. §§ 2601-2629 (1982).

83. *Id.* § 2601(a)(2).

84. A use or activity only amounts to a public or private nuisance if the activity constitutes an unreasonable interference with a protected interest. Generally, the plaintiff must show that the gravity of harm involved outweighs the social value of the activity. See RESTATEMENT OF TORTS §§ 826, 828 (1939). More recently, some courts have sought guidance from the RESTATEMENT (SECOND) OF TORTS §§ 826, 829A (1977), which adopts an alternative balancing calculus that increases the likelihood of finding an unreasonable interference:

An intentional invasion of another's interest in the use and enjoyment of land is unreasonable if (a) the gravity of harm outweighs the utility of the actor's conduct, or (b) the harm caused by the conduct is serious and the financial burden of compensating for this and similar harm to others would not make the continuation of the conduct not feasible.

Id. § 826.

85. See *Environmental Defense Fund, Inc. v. EPA*, 636 F.2d 1267, 1277-79 (D.C. Cir. 1980) (court examines unreasonable risk regulatory standard of TOSCA in connection with the restriction and control of PCBs).

86. Note, *supra* note 23, at 804 n.32. Existing federal statutes "seek to control the behavior of the polluter rather than to compensate the victims of polluting conduct." *Id.*

87. *Id.* at 806 n.36.

88. The provision of TOSCA that has generally been most ineffectual is the one mandating the premanufacture notification to the EPA for new chemical substances. Very few illuminating notifications have actually occurred, primarily because chemical manufacturers allege confidentiality and that the use and disclosure of this information offends the Trade Secrets Act, 7 U.S.C. § 136(h) (1982). But see *Ruckelshaus v. Monsanto Co.*, 104 S. Ct. 2862, 81 L. Ed. 2d 815 (1984). The Court held that the EPA's use or disclosure of similar information concerning pesticides obtained under FIFRA did not violate the fifth amendment taking clause, U.S. CONST. amend. V, § 4. 104 S. Ct. at 2876, 81 L. Ed. 2d at 835. Because of the EPA's inability to obtain vital information about the toxicity of many chemicals currently in use, the EPA has essentially been forced to regulate in the dark.

89. 42 U.S.C. §§ 9601-9657 (1982).

number of hazardous waste sites.⁹⁰ Superfund's central feature is now a \$9 billion fund⁹¹ that primarily permits the EPA to clean up hazardous waste sites before attempting to recover the costs of such cleanup from the responsible parties.⁹² Strict liability is the standard of liability imposed upon a responsible party;⁹³ this liability is generally considered to be joint and several.⁹⁴ To be sure, these touchstones inure to the benefit of the government when seeking recovery of cleanup costs.⁹⁵ Secondly, Superfund also imposes liability up to \$50 million for damages to governmentally owned natural resources resulting from the release of hazardous substances.⁹⁶

But where does Superfund leave an individual victim of exposure from a hazardous waste site? The answer is quite simple, but all too common: the individual must pursue compensatory relief in state courts, normally pursuant to common law theories, for Superfund has no general victim compensation provision.⁹⁷ The lack of authority for awarding individuals compensatory relief is more apparent here than in, perhaps, any other federal environmental statute because Congress has repeatedly rebuffed efforts to place a victim compensation provision in Superfund.⁹⁸

90. COMPTROLLER GENERAL OF THE U.S., HAZARDOUS WASTE SITES POSE INVESTIGATION, EVALUATION, SCIENTIFIC, AND LEGAL PROBLEMS 39 (1981).

91. The \$1.6 billion revolving fund expired at the end of fiscal 1985. Congress passed new Superfund legislation recently, however, and the President signed it into law. *See supra* note 34.

92. COMPTROLLER GENERAL OF THE U.S., *supra* note 90, at 2.

93. 42 U.S.C. § 6901(32) (1982). The liability standard under this section of Superfund is the same as that under § 311 of the Clean Water Act, which imposes strict liability. *See United States v. Northeastern Pharmaceutical & Chem. Co.*, 579 F. Supp. 823, 843-44 (W.D. Mo. 1984).

94. *See United States v. Chem-Dyne Corp.*, 572 F. Supp. 802, 807-08 (S.D. Ohio 1983). Congress specifically rejected efforts to provide expressly for joint and several liability in Superfund legislation. Some courts, however, have implied such liability because Congress has never specifically precluded the liability by statutory language. *Id.* Others have looked to principles of joint and several liability embodied in RESTATEMENT (SECOND) OF TORTS § 433B (1964). *But see Epstein, Two Fallacies in the Law of Joint Torts*, 73 GEO. L.J. 1377, 1382-88 (1985) (application of joint and several liability would hold all defendants equally liable for clean-up costs even though their fractional contributions might vary widely).

95. The advantages of not having to implicate a responsible party's conduct by establishing fault are self-evident. Even more significant, however, is that "entire liability" offers the government the opportunity to recover the entire amount of the clean-up costs from any one of several possible responsible parties.

96. 42 U.S.C. § 9607(c)(1)(D) (1982).

97. The Superfund legislation does create a right of action, justiciable in federal court, for private and nonfederal plaintiffs to recover necessary "response" costs resulting from a release of hazardous substances. . . . This provision, however, only provides for compensation of limited response costs, specifically precluding money damages for medical expenses, property loss, and so-called health prophylactic damages.

Note, *supra* note 23, at 806 (footnote omitted).

98. Congress initially included a victim compensation provision in the Superfund legislation just enacted. As expected, the chances for its passage were nil. Address by F. Grad, Environmental Law Conference (1984). Some individuals, however, continue to maintain that victim compensation is not a dead legislative issue. Address by J. Futrell, Hazardous Wastes, Superfund and Toxic Substances Conference (Oct. 31-Nov. 2, 1985). Mr. Futrell is the President of the Environmental Law Institute.

g. *Concluding Remarks on Federal Environmental Statutory Protections.* Two writers, recently commenting on Superfund, observed that it contains "no provisions for the recovery of damages for personal injury and property damage resulting from exposure to hazardous wastes."⁹⁹ This statement can be fairly ascribed to all of the primary federal environmental statutes,¹⁰⁰ thus greatly undermining the adequacy of a federal cause of action resulting from an environmental toxic tort.¹⁰¹ Consequently, in the federal sector, a hazardous or toxic waste exposure victim cannot reach even the arcane questions of statute of limitations, causation, and apportionment of damages, for no private cause of action for damages exists for transgression of the various federal environmental statutes.¹⁰²

This major shortcoming of federal law fosters a situation marked by inadequate compensation, less than desirable deterrence, and little, if any, corrective justice between the parties.¹⁰³ Against this backdrop, it is clear that "[i]ndividual victims cannot be ignored today in the hope that government may decide to protect the common weal tomorrow."¹⁰⁴ Until Congress acts positively, however, individual victims must focus upon state statutory and common law to seek redress for their toxic or hazardous exposure injuries.

2. *State Environmental Statutes*

"Environmental protection is now one of society's imperatives, and, accordingly, is perceived as one of government's fundamental responsibilities."¹⁰⁵ That this responsibility is shared by both the federal government and its state counterparts is well-established.¹⁰⁶ In pursuit of this objective, several states have enacted environmental protection legislation¹⁰⁷ and es-

99. Zazzali & Grad, *supra* note 4, at 446.

100. See *supra* notes 49-98 and accompanying text.

101. Zazzali & Grad, *supra* note 4, at 458-59.

102. The United States Supreme Court quelled any notion that some federal common law cause of action might overcome the deficiency of the federal statutes when the Court held that the detailed provisions of the Clean Water Act signaled preemption of the federal common law of nuisance with respect to interstate water pollution. *City of Milwaukee v. Illinois*, 451 U.S. 304, 326 (1981). The same rationale probably applies to the Clean Air Act and perhaps to other federal environmental statutes as well. See R. FINDLEY & D. FARBER, *supra* note 60, at 64.

103. Congress's unwillingness, to date, to add a victim compensation provision to the federal environmental statutes may not be grounded on sound policy notions; rather, a more plausible explanation is that no political consensus exists in Congress to support this provision. "CERCLA was originally drafted with a provision for victim compensation, but this provision was deleted in a compromise with legislators perceived as necessary to secure Congress' approval of the Act." Note, *Developments*, *supra* note 62, at 272 n.5.

104. Zazzali & Grad, *supra* note 4, at 474. If the individuals who cause the damages bear the cost, which generally does not occur in toxic tort litigation, these individuals contribute to the general welfare.

105. Note, *Successor Landowner Liability for Environmental Torts: Robbing Peter to Pay Paul?*, 13 RUTGERS L.J. 329, 329 (1982).

106. *Id.* at 329-30 n.3. Federal environmental statutes have granted significant implementation responsibilities to the states. The Clean Air Act grants the basic responsibility for developing a State Implementation Plan, and for granting variances to its provisions, to the states. 42 U.S.C. § 7410 (1982).

107. Perhaps out of practical necessity, New Jersey has been a pioneer state in regard to environmental legislation. See New Jersey Solid Waste Management Act, N.J. STAT. ANN.

established agencies to enforce these laws.¹⁰⁸

Verdicts on the effectiveness of these state laws have been mixed.¹⁰⁹ Most state statutes provide principally for injunctive relief, like their federal counterparts.¹¹⁰ This flaw diminishes the utility of these statutes to toxic tort victims.¹¹¹ In a rare instance, California has enacted a statute that provides for actual compensation of the victim of an environmental tort for personal injuries or property damage.¹¹² Otherwise, exposure victims have had to resort to the relevant state workers' compensation laws for occupational exposure injuries and traditional common law doctrines for nonoccupational injuries.¹¹³ The proof requirements for causation are slightly less onerous in the workers' compensation field than for common law torts, but proof problems persist in both.¹¹⁴ Hence, establishing the requisite causal connection between the toxic or hazardous exposure brought on by the defendant's conduct and the injury suffered by the plaintiff is a conundrum irrespective of the particular legal forum.

§§ 13:1E-1 to -48 (West 1979); New Jersey Air Pollution Control Act, N.J. STAT. ANN. §§ 26:2C-1 to -36 (West 1964 & Supp. 1986); New Jersey Spill Compensation and Control Act, N.J. STAT. ANN. §§ 58:10-23.11 to .11z (West 1982); New Jersey Water Pollution Control Act, N.J. STAT. ANN. §§ 58:10A-1 to -20 (West 1982). California and Minnesota have also enacted environmental legislation with progressive victim compensation models. See California Hazardous Substances Account Act, CAL. HEALTH & SAFETY CODE §§ 25300-25395 (West 1984 & Supp. 1985); Minnesota Environmental Response and Liability Act, MINN. STAT. ANN. § 115B.01-115.24 (West 1984 & Supp. 1985).

108. ARK. STAT. ANN. § 5-908 (1976), for example, authorizes the Arkansas Pollution Control and Ecology Department.

109. The problem may not lie with the substantive features of the various state environmental statutes, but rather with the state enforcement mechanisms. Inadequate financing and staffing of the environmental agencies, coupled with a strong undercurrent of political pressure, have adversely affected the efficacy of the enforcement of state environmental laws. Moreover, most state environmental protection acts (SEPA's) specifically do not cover private activities. See N.C. GEN. STAT. § 133A-4(2) (1983); VA. CODE § 10-178 (1985). Some SEPA's do not even mandate compliance by local governments. See MD. NAT. RES. CODE ANN. § 1-301(d) (1983); N.C. GEN. STAT. § 113A-8 (1983). For a detailed discussion of the parameters of SEPA's see Pridgeon, Anderson & Delphey, *State Environmental Policy Acts: A Survey of Recent Developments*, 2 HARV. ENVTL. L. REV. 419 (1977).

110. See, e.g., ALASKA STAT. § 46.03.822 (1982) (victim compensation on strict liability standard); Hazardous Substance Account Act of 1981, CAL. HEALTH & SAFETY CODE §§ 25186, 25300-25395 (West 1984) (also known as the California Superfund); FLA. STAT. ANN. § 376.12 (West Supp. 1981) (Oil Spill Prevention and Pollution Control Act applies to damage payment from nonhazardous spills to vessel or land); MASS. GEN. LAWS ANN. ch. 214, § 7A (West 1981) (10 or more Massachusetts citizens can seek injunction for state/local environmental law violations).

111. See Comment, *Common Law and the Toxic Tort: Where Does Superfund Leave the Private Victim of Toxic Torts?*, 86 DICK. L. REV. 725, 735 (1982) (although a victim-based statute, Superfund fails to compensate victims).

112. CAL. HEALTH & SAFETY CODE §§ 25300-25395 (West 1984 & Supp. 1985).

113. Here again the traditional common law tort theories are generally strict tort liability, private and public nuisance, trespass, and negligence. Note, *supra* note 105, at 330.

114. Moreover, workers' compensation laws, although dispensing with fault requirements and, generally, dispensing with the affirmative defenses of contributory negligence, assumption of the risk, and the fellow servant doctrine, contain limitations to recovery and are usually an employee's exclusive remedy against the employer. An action in tort against a third-party tortfeasor is always a possibility. See 2A A. LARSON, WORKMEN'S COMPENSATION LAW § 71.00 (1983).

3. *Common Law Theories*

Unlike the various federal and state environmental statutes, which are basically regulatory, the common law tort system extends the prospect of compensatory relief to a toxic tort victim. Whether the cause of action is grounded in trespass, negligence, public or private nuisance, strict liability in tort, or strict products liability in tort,¹¹⁵ the likelihood exists that the exposure victim will receive some measure of compensation for his or her injuries, provided the victim successfully prosecutes his or her suit.¹¹⁶ Because of this possibility the common law of torts appears at first blush to be the most promising means of providing relief for injuries suffered from environmental torts. Upon serious reflection, however, the traditional common law of torts may not be so promising, at least in its unadulterated form.¹¹⁷ Under each of the traditional tort theories, for example, proof of causation is an essential predicate for recovery. Proof of causation may create a virtually insurmountable hurdle for the victim because of the unique nature of a toxic tort injury.¹¹⁸ This Article later examines the causation element in an attempt to ascertain a less onerous means by which causation may be established in a toxic tort suit.¹¹⁹

4. *Scientific Prophylactic Alternatives: An Ounce of Prevention May Be Worth More Than a Pound of Cure*

Scientific knowledge is a major underpinning of effective environmental protection.¹²⁰ Specifically, science plays a prominent role as a predictor of the environmental consequences of a certain activity. In the acid rain controversy, for example, science has benefitted society by determining that scrubbers in the smokestacks of coal plants and smelters can mitigate sulfur dioxide and nitrogen oxide emissions and thus alleviate the incidence of ruinous acid rain pollution.¹²¹ In the scientifically based effluent limitations

115. A cause of action in tort may also lie on tortious misrepresentation. See *Starling v. Seaboard Coast Line R.R.*, 533 F. Supp. 183, 192 (S.D. Ga. 1982) (fraud claim based on asbestos exposure).

116. In certain circumstances courts may grant punitive or exemplary damages in addition to compensatory damages. The standards for making a punitive damages award vary from jurisdiction to jurisdiction, but the common requirement seems to be an element of conscious wrongdoing. C. MCCORMICK, DAMAGES 188 (1935).

117. "Unadulterated form" means traditional tort principles, free from any significant modification.

118. See Note, *Developments, supra* note 62, at 272-73 (toxic tort plaintiffs must carry the traditional burden of proving causation). The principal factors complicating the causation question are latency and causal indeterminacy. *Id.* at 273 n.9.

119. See *infra* notes 134-255 and accompanying text.

120. Ironically, a frequently cited reason for the deficiencies in the regulatory control of the environment under the various federal and state statutes is the lack of scientific certainty. See Trubatch, *Informed Judicial Decisionmaking: A Suggestion for a Judicial Office for Understanding Science and Technology*, 10 COLUM. J. ENVTL. L. 255, 255-56 (1985). Industry undoubtedly has an economic stake, and, as a result, sometimes claims "that regulations are too stringent and not supported by scientific evidence." *Id.* at 256. Industry perhaps may even use scientific uncertainty as a ruse to avoid additional costs associated with the utilization of advanced scientific knowledge to prevent further environmental degradation.

121. Although little doubt exists about the effectiveness of scrubbers in relieving the acid rain problem, industry continues to maintain that scrubber costs outweigh the environmental

under the Clean Water Act¹²² and emission limitations under the Clean Air Act,¹²³ Congress and the EPA have formulated within the statutes themselves and through administrative regulation and rulemaking an essentially scientific prediction of what is an acceptable level of water and air pollution.¹²⁴ These limitations are simply predictions of the greatest amount of water and air pollution reasonably allowable without creating an undue danger to human health and the environment.¹²⁵ Stated somewhat differently, these limitations are the minimum prophylactic standards to which industry must comply in order to protect the environment.¹²⁶

Science not only fulfills its role as a prognosticator in the various ways mentioned above, but it also can help prevent deleterious degradations of the environment by devising alternative means for the disposal of pollutants. A perfect case in point is the disposal of toxic or hazardous wastes. Toxic or hazardous waste sites pose a significant risk of contamination to ground-water supplies.¹²⁷ Scientific studies suggest that burning most, if not all, of this waste may be a feasible alternative.¹²⁸ Burning the wastes would allevi-

risk. *Reagan's Reaction Cautious to Proposal on Acid Rain*, Cincinnati Enquirer, Jan. 9, 1986, at A-3, col. 1, states that: "The Edison Electric Institute, which represents most private utilities . . . backs clean-coal technology, aimed at removing sulfur from coal as it is burning, an alternative to the expensive but effective process of scrubbing it from exhaust."

122. Beginning in 1972, Congress decided to regulate water pollution from point sources on the basis of technology-based effluent limitations (discharge standards). In ascending order of compliance date and stringency, these limitations are best practicable control technology available by July 1, 1977; best conventional technology by July 1, 1984; and best available technology economically achievable by July 1, 1984. 33 U.S.C. § 1311(b) (1982).

123. Under the Clean Air Act the EPA administrator has established primary and secondary National Ambient Air Quality Standards (NAAQSs) for several critical pollutants: carbon monoxide, lead, ozone, sulfur dioxide, and nitrogen oxide. Each state must, in its state implementation plan, devise a strategy or mix of approaches to meet the primary NAAQSs as expeditiously as practicable, but not later than three years, and the secondary NAAQSs within a reasonable time. 42 U.S.C. §§ 7409-7410 (1982).

124. To get a § 402 pollution permit to discharge effluents into a navigable stream, for example, a polluter has to meet the applicable technology-based federal effluent limitations or state ambient water quality standards, if the state standards are more stringent than the federal standards. Otherwise, the effluent discharge will be in violation of the Clean Water Act.

125. Note that neither the Clean Water Act nor the Clean Air Act call for an abrupt cessation of water and air pollution. The major justification for this gradual approach is to prevent economic turmoil. Congress does not approach the question of the quality of the environment in a vacuum despite the importance of the issue. A countervailing factor is economic output. Thus, subsumed within environmental law is a seemingly relentless quest to strike an appropriate balance between economic growth on the one hand and the quality of the environment on the other. See T. SCHOENBAUM, *supra* note 26, at 60.

126. A striking example of the minimal nature of federal standards is the states' right to adopt more stringent standards than those prescribed by federal laws and regulations. See *Homestake Mining Co. v. EPA*, 477 F. Supp. 1279, 1284 (D.S.D. 1979) (states clearly can adopt more stringent standards than those in federal statute).

127. R. FREEZE & J. CHERRY, *supra* note 66, at 8. Contamination of the groundwater may be the chief environmental threat facing this country. See *supra* notes 65-67 and accompanying text.

128. See, e.g., C. DIAL, HAZARDOUS WASTE TREATMENT RESEARCH—U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA, Cincinnati, Ohio, Hazardous Waste Engineering Research Laboratory 1985) (treatment and thermal destruction among most viable methods for disposing of hazardous wastes); F. HALL, W. KEMNER, G. ANNAMRAJU, R. KRISHNAN, M. TAFT-FRANK & D. ALBRINCK, EVALUATION OF THE FEASIBILITY OF INCINERATING HAZARDOUS WASTE IN HIGH-TEMPERATURE INDUSTRIAL PROCESSES (EPA, Cincinnati, Ohio,

ate the leaching problem associated with the threat to the groundwater created by hazardous waste sites.¹²⁹ Of further importance in the preventive role played by science are the monitoring¹³⁰ and modelling¹³¹ processes aimed at keeping environmental pollution in check. Moreover, field and laboratory studies are invaluable aids to effective environmental planning.¹³²

In summary, science is a good predictor; as such, its primary environmental role is preventive in nature. This role is vital because the cost of preventing an environmental disaster is generally much less than the cost of cleaning up one.¹³³ Thus, through science, an ounce of prevention may be worth more than a pound of cure.

Industrial Environmental Research Laboratory 1984) (identifies and examines many alternative methods of incineration in view of "time, temperature profile, geographical location, product quality consideration, institutional factors, and environmental impacts"); D. OBERACKER, *HAZARDOUS WASTE INCINERATOR PERFORMANCE EVALUATIONS BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY* (EPA, Cincinnati, Ohio, Hazardous Waste Engineering Research Laboratory 1984); A. TRENHOLM, P. GORMAN, G. JUNGCLAUS, *PERFORMANCE EVALUATION OF FULL-SCALE HAZARDOUS WASTE INCINERATORS, VOLUME II, INCINERATOR PERFORMANCE RESULTS* (EPA, Cincinnati, Ohio, Industrial Environmental Research Laboratory 1984). Of course, if the byproducts of incineration are hazardous or toxic air pollutants, this incineration could violate § 112 of the Clean Air Act, 42 U.S.C. § 7412 (1982).

129. Scientifically approved waste site liners will also ameliorate the problem. "Natural and manmade liners are currently being used to prevent or minimize seepage of polluting fluids from surface impoundments and landfills. . . . Either they physically impede the flow of fluid; or they absorb or retain contaminating, unwanted chemicals in the fluid." D. SHULTZ, *FIELD STUDIES OF LINER INSTALLATION METHODS AT LANDFILLS AND SURFACE IMPOUNDMENTS I* (EPA, Cincinnati, Ohio, Municipal Environmental Research Laboratory 1984). Field observations made at twenty-one liner construction sites indicate that installers generally complied with liner industry standards. *Id.* at 4. These standards, however, vary in terms of quality control and testing requirements. *Id.* "No particular liner installation technique or procedure guarantees a successful liner system." *Id.*

130. The Clean Air Act, 42 U.S.C. § 7475(e)(2) (1982), provides that "analysis required by this subsection shall include continuous air quality monitoring data gathered for purposes of determining whether emissions from such facility will exceed the maximum allowable increases or the maximum allowable concentration permitted under this part."

131. *Id.* § 7475(e)(3)(D) provides that regulations "shall specify with reasonable particularity each air quality model or models to be used under specified sets of conditions for purposes of this part." For a discussion of modeling and its utility under the Clean Air Act see Edwards, *Through the Crevices: Acid Rain and The Clean Air Act*, 11 OHIO N.U.L. REV. 671, 693-97 (1984).

132. Knowing what will or could happen at a particular site regarding pollution is vital if action is to be taken to control, alleviate, or prevent an environmental mishap. For example, the length of time required for an aquifer to cleanse itself of pollutants is usually measured in decades. To solve new or existing pollution occurrences, therefore, new strategies are based on (1) detailed analysis of groundwater samples, (2) monitoring wells, (3) option assessment, (4) site assessment, and (5) pollution control studies. These involve laboratory and field analysis. D. MILLER, F. DELUCA & T. TESSIER, *GROUNDWATER CONTAMINATION IN NORTHEAST STATES* 301-14 (EPA, Ada, Oklahoma, Robert S. Kerr Environmental Research Laboratory 1974). Laboratory and field studies have provided well-established concepts for the recovery and treatment of contaminated groundwater. Quince & Gardner, *Recovery and Treatment of Contaminated Ground Water* (pt. 1), *GROUND WATER MONITORING REV.*, Summer 1982, at 18, 22.

133. A good example of the adage that prevention is cheaper than cure is the Times Beach, Missouri, environmental disaster. Cleanup costs incurred exceeded the amount that would have been required to avert the dioxin contamination in the first place by millions of dollars. For a discussion of the huge costs associated with pollution see T. SCHOENBAUM, *supra* note 26, at 8. The costs include: (1) "the loss of resources through unnecessary wasteful exploitation, (2) the cost of pollution abatement control, (3) the cost in human health." *Id.*

III. TOXIC TORT LITIGATION: THE CAUSATION PROBLEM

A. *Applying Traditional Tort Principles to the Nontraditional Toxic Tort: A Conundrum*

The application of traditional tort principles to toxic tort cases greatly increases the difficulty of recovery by an exposure victim.¹³⁴ The simple explanation for the unusual problems attendant to toxic tort litigation is that traditional common law tort principles do not apply very well to this non-traditional tort with its inherent idiosyncrasies, which were unknown when the conventional rules evolved.¹³⁵ One of the more formidable roadblocks to successful toxic tort litigation, from the exposure victim's perspective, is establishing the element of causation, an integral component of any toxic tort case irrespective of the underlying liability theory.¹³⁶

Trial lawyers have the responsibility to protect tort victims.¹³⁷ Courts also, informed by the analyses of many individuals, including legal scholars, should explore theories that will reduce the plaintiff's burden with respect to causation and at the same time promote the traditional policy objectives of tort law.¹³⁸ This Article now focuses on modifications to the common law of torts that may facilitate the application of the causation element to the field of toxic torts.¹³⁹

134. Note, *supra* note 1, at 583-84. "Causal indeterminacy . . . creates great difficulties for a toxic waste victim attempting to prove causation under common law rules." *Id.* at 584; see Trauberman, *supra* note 19, at 197-201; Comment, "Close Encounters of the Toxic Kind"—*Toward an Amelioration of Substantive and Procedural Barriers for Latent Toxic Injury Plaintiffs*, 54 TEMP. L.Q. 822, 824 (1981) [hereinafter cited as Comment, *Close Encounters*]; Note, *Establishing Causation in Chemical Exposure Cases: The Precursor Symptoms Theory*, 35 RUTGERS L. REV. 163, 180 (1982); see also Comment, *Agent Orange as a Problem of Law and Policy*, 77 NW. U.L. REV. 48, 65-71 (1982) [hereinafter cited as Comment, *Agent Orange*] (proof of causation is one of the greatest barriers to recovery by veterans for exposure to Agent Orange).

One commentator noted that "[t]he evaluation of a personal injury case arising from exposure to toxic materials presents a lawyer with a challenge of great dimensions." Landau, *Hurdling the Barriers to Toxic Tort Recovery: An Update*, TRIAL, Apr. 1983, at 40, 41.

135. The common law rules arguably operate reasonably well in connection with sporadic accidents, the traditional type of circumstance that the tort system has been generally concerned with over the years. *But see* Rosenberg, *supra* note 6, at 854. "Current criticism of the tort system as a scheme too cumbersome, costly, and haphazard to accomplish its accident prevention and compensation objectives . . . suggests that our reliance on private damage actions is misplaced." *Id.* (footnote omitted) (citing J. O'CONNELL, *THE LAWSUIT LOTTERY* 130, 140-45 (1979); Pierce, *Encouraging Safety: The Limits of Tort Law and Government Regulation*, 33 VAND. L. REV. 1281, 1300 (1980)).

136. The toxic tort victim must overcome a number of barriers to prevail in private litigation. The victim must (1) meet the statute of limitations requirements, (2) identify responsible defendants, and (3) indict the conduct of a specific defendant or a group of defendants. See Note, *Developments*, *supra* note 62, at 272-73. One of the most sophisticated problems is meeting the standards prescribed for complying with the burden of proof of causation. Rosenberg, *supra* note 6, at 855.

137. Landau, *supra* note 134, at 41.

138. Compensation, deterrence, and corrective justice between the parties are generally recognized as the chief goals of tort law. See *supra* text accompanying note 8.

139. "This field is ripe for imaginative approaches to legal problems." Landau, *supra* note 134, at 41.

*B. The Traditional Approach to Causation: Why It Fails
in Toxic Tort Cases*

Because the various federal and state regulatory statutes provide no adequate compensatory relief for harm suffered by a toxic substance or hazardous waste exposure victim,¹⁴⁰ private tort litigation is the primary, if not exclusive, means of redressing such harm.¹⁴¹ Courts generally apply traditional tort principles, including those pertaining to causation,¹⁴² to ascertain whether an alleged exposure victim's injury warrants recovery. The flaws of the common law approach to causation in toxic tort litigation stem primarily from the unique nature of a tortious injury resulting from the exposure to toxic or hazardous wastes.¹⁴³ These injuries generally remain dormant for a number of years before manifesting themselves.¹⁴⁴ In addition, in the case of groundwater contamination, defining the migration patterns of toxic substances or hazardous wastes through the soil frequently presents complicated problems.¹⁴⁵ Uncertainty as to the effects of hazardous substances on the human body also has created significant hurdles to establishing a causal nexus between the exposure resulting from the defendant's conduct and the plaintiff's ensuing injuries.¹⁴⁶ In short, a plethora of uncertainty spawned by prolonged latency periods and scientific causal indeterminacy portend trouble for plaintiffs in lawsuits seeking damages for personal injury or property damage resulting from exposure to toxic substances or hazardous wastes.¹⁴⁷

140. For a discussion of this deficiency in the various environmental statutes see *supra* notes 49-114 and accompanying text. See also Keller, *Toxic Tort Litigation: The Management Challenge*, TRIAL, Apr. 1983, at 50, 51.

141. Keller, *supra* note 140, at 52.

142. *Id.*

143. The same problem also persists to some degree in cases involving exposure to hazardous products. Although scientists know much about asbestos, for example, proof of causation problems in asbestos cases are greater than in conventional tort actions. In any asbestos case substantial problems may occur in demonstrating that the injury of the plaintiff resulted from the exposure to asbestos for which the defendant was responsible. This was especially true a few years ago when the probability of asbestos exposure was almost limitless, thus creating a number of possible sources of exposure and reducing the likelihood of establishing causation by the preponderance of the evidence.

144. See Levy, *Radiation Litigation—The Emerging Tort Field*, 1981 TRIAL LAW. GUIDE 568, 571 n.3 (asbestos exposure has a 15-25-year latency period; vinyl chloride has a 20-year latency period). See generally Ginsberg & Weiss, *Common Law Liability for Toxic Torts: A Phantom Remedy*, 9 HOFSTRA L. REV. 859, 921-22 (1981) (comments on latency phenomena in toxic and hazardous exposure cases); Trauberman, *supra* note 19, at 180 (latency period between exposure and manifestation of cancer may range between 5 and 40 years).

145. Some continue to subscribe to the notion that the migration patterns of hazardous wastes are fraught with scientific uncertainty in terms of the direction of the flow and its velocity. See *Johnson v. Tipton*, 103 Ill. App. 3d 291, 431 N.E.2d 464, 470 (1982). This uncertainty can frustrate the injured party's ability to meet the conventional burden of establishing the requisite causal connection.

146. Asbestos is a prime example. Although scientists were fairly certain of the causal connection between the inhalation of asbestos and the contracting of cancer (mesothelioma) or asbestosis, scientists were less certain about the effects of the ingestion of asbestos on human health. See *Reserve Mining Co. v. EPA*, 514 F.2d 492, 510-14 (8th Cir. 1975).

147. See Trauberman, *supra* note 19, at 197-201; Comment, *Acid Rain—The Limitations of Private Remedies*, 1983 S. ILL. U.L. REV. 515, 516-21; Note, *The Burden of Proof*, *supra* note 19, at 207-08.

How are these unique aspects of toxic tort litigation incongruous with common law causation principles? The answer is almost transparent. First, the plaintiff has the burden of proof on the issue of causation.¹⁴⁸ Once again, to meet this burden, the injured party must establish by the preponderance of the evidence, which is a probability in excess of fifty percent, that but for the defendant's conduct, the plaintiff would not have been injured or that the defendant's conduct was a substantial factor in bringing about the plaintiff's injury.¹⁴⁹ In toxic tort litigation the plaintiff will have a difficult, if not impossible, task in establishing specific causation by the preponderance of the evidence because of the long lapse of time usually involved, the practical difficulty of pinpointing the specific source of the contamination, and the arduous task of identifying the responsible party.¹⁵⁰

C. Possible Alternatives to the Traditional Approach to Causation in Toxic Tort Litigation

Traditional causation principles such as the specific causation requirement, the preponderance rule, the "but for" test, and the "substantial factor" test are generally unsuitable for toxic tort litigation for the various reasons discussed above.¹⁵¹ The formulation of alternative causation theories that are consonant with toxic tort thus is necessary to ensure that meritorious claims do not go uncompensated or undercompensated and, more significantly, that tort law remains a ready source of compensation for the innocent exposure victim, a means of deterring the culpable party, and a vehicle for achieving some semblance of corrective justice between the parties.¹⁵² Therefore, a discussion of alternate theories to and possible modifications of conventional causation principles dominates the next few sections of this Article.

A cardinal tenet of traditional common law torts is that the plaintiff must prove that the defendant is responsible for the plaintiff's harm.¹⁵³ This principle does not generally present any insurmountable problems to the plaintiff

148. Causation, as used in this Article, is causation-in-fact, occasionally alluded to as simple causation, which relates to the factual relationship between cause and effect. Although some policy considerations enter into this determination, see *Summers v. Tice*, 33 Cal. 2d 80, 199 P.2d 1, 5 (1948), causation-in-fact should not be confused with the exclusively policy-laden concept of proximate cause. See *Malone*, *supra* note 14, at 97. The "substantial factor" concept affords a court flexibility to make policy determinations under the guise of causation-in-fact. *Id.* at 89.

149. Courts appear to favor the substantial factor test. *PROSSER*, *supra* note 16, § 41, at 267-68.

150. The problems attendant to establishing causation in toxic tort litigation exist for a variety of reasons in addition to latency. For other scientific problems that may forestall recovery see *Keller*, *supra* note 140, at 53.

151. For an in-depth treatment of inutility of traditional causation concepts in the field of toxic torts see *Rosenberg*, *supra* note 6, at 855-59.

152. Compensation, deterrence, and corrective justice lie at the very heart of tort policy. See *supra* text accompanying note 8.

153. *Schwartz & Means, The Need for Federal Product Liability and Toxic Tort Legislation: A Current Assessment*, 28 VILL. L. REV. 1088, 1104 (1982-1983). The underlying rationale for making specific causation a sine qua non to recovery is that, as a matter of justice, only the defendant who actually caused the damage should have to provide recompense.

in a typical, sporadic accident situation.¹⁵⁴ In the case of a toxic tort, however, in which identifying the toxic substance or hazardous waste that caused the exposure injury and the responsible party is difficult, the relentless quest for particularistic evidence¹⁵⁵ of specific causation simply tends to obliterate the plaintiff's chances of recovery.¹⁵⁶

Given this unpleasant prospect, serious consideration has been given to devising possible exceptions to the rule of imposing liability only on the person responsible for the harm.¹⁵⁷ Developing exceptions to the requirement of specific causation has been justified mainly on the basis that requiring the innocent exposure victim to bear the entire loss simply because he or she cannot meet the arduous, if not impossible, task of establishing the specific cause of his or her toxic injuries is contrary to public policy.¹⁵⁸ The necessity of producing vast amounts of sophisticated statistical data correlating certain diseases and environmental exposures¹⁵⁹ makes the requirement of demonstrating specific causation even more strenuous. Thus, the dispositive issue centers fittingly upon how to assuage the causation problems in toxic tort litigation presented by an unswerving adherence to the rule of specific causation.¹⁶⁰ To date, the response to this challenge has more often than not entailed the creation of some mechanism to ease the plaintiff's burden, most commonly the shifting of the burden to the shoulders of the defendant.¹⁶¹ The resolution of the causation problem thus has simply been accomplished

154. Generally, the plaintiff can readily identify the responsible tortfeasor and discern the instrumentality causing the injury. Moreover, a close temporal relationship ordinarily exists between the act of the defendant and the resulting injury to the plaintiff. One commentator, however, has questioned the accuracy and fairness of the causation determination in these tort cases under the preponderance of the evidence rule. Rosenberg, *supra* note 6, at 855-59.

155. Particularistic evidence is direct, nonstatistical evidence of the causal connection. *Id.* at 857, 869. This evidence generally is preferable to statistical or probabilistic evidence even though close reflection reveals that a high degree of probability inheres to particularistic evidence. As some have astutely noted, direct eye-witness evidence is perhaps more inherently suspect than circumstantial evidence. See PROSSER, *supra* note 16, § 39, at 243.

156. Schwartz & Means, *supra* note 153, at 1100-01; see also Zazzali & Grad, *supra* note 4, at 457 (proof of causation is major recurring issue).

157. Schwartz & Means, *supra* note 153, at 1101.

158. See *Sindell v. Abbott Laboratories*, 26 Cal. 3d 588, 607 P.2d 924, 928-29, 163 Cal. Rptr. 132, 136-37 cert. denied, 449 U.S. 912 (1980); *Summers v. Tice*, 33 Cal. 2d 80, 199 P.2d 1, 4 (1948). But see *Zafft v. Eli Lilly & Co.*, 676 S.W.2d 241, 246 (Mo. 1984) (court rejected policy argument that innocent plaintiff should recover even if defendant who caused the harm not specifically identified; court noted that not all deserving plaintiffs are assured of winning in the tort system).

159. Zazzali & Grad, *supra* note 4, at 457-58.

160. *Id.* at 458. "[P]roof of the causal connection between exposure and injury is an almost overwhelming barrier to recovery, particularly in smaller cases (regardless of their merit) because the cost of mounting the massive probative effort and the arrays of technical and scientific evidence will be prohibitive." *Id.*

161. The effect of this shift in responsibility is that the causation burden of proof is as difficult for the defendant to meet as for the plaintiff, so the plaintiff's chances of recovery increase when the burden shifts to the defendant. "Defendants will be faced with the same difficulties of proof that would have barred the plaintiff's recovery had the theory of joint liability not been applied to assist his case." Note, *Causation*, *supra* note 38, at 677 (emphasis in original); see also Rosenberg, *supra* note 6, at 856 n.28 (defendants have no better information than plaintiffs on issue of specific causation).

by placing the defendant in the uncomfortable shoes once worn exclusively by the plaintiff.

1. *Alternative Liability*

One noteworthy exception to the specific causation rule is the principle of alternative liability that seminally arose out of *Summers v. Tice*,¹⁶² a case with a very intriguing fact pattern. The plaintiff was shot in the eye by someone firing a gun. The two defendants had negligently discharged their guns in the plaintiff's vicinity. The plaintiff, however, could not identify which of the two defendants actually shot him. The court, while clearly seeking to mete out some form of corrective justice in view of the consequent proof dilemma that faced the plaintiff, ruled that the burden of proof as to causation was shifted to the defendants to establish that they did nothing to cause the plaintiff's injury.¹⁶³ Furthermore, the court shifted the burden of apportioning damages to the defendants.¹⁶⁴ These shifts dramatically reduced the plaintiff's burden of establishing the defendants' liability by simply placing the defendants in the same difficult position that the plaintiff would otherwise have occupied. The court was willing to advance its policy objectives in this extraordinary manner because fault clearly existed on the part of both defendants, and alternative liability would, therefore, not do violence to the interests of either.¹⁶⁵ Moreover, the court's action simply expressed the basic principle that tort liability should fall on the party most likely to have done the harm as opposed to the purely innocent one.

In its application to the field of toxic torts the alternative liability theory is naturally appealing because of the ameliorative effect it has upon the plaintiff's causation burden. The exposure victim's likelihood of recovering from a culpable defendant is markedly enhanced when the defendant carries the causation onus.¹⁶⁶ Limitations as to the application of the alternative theory serve to diminish its attractiveness, however. Courts are generally loath to adopt this exception to specific causation in cases involving no clear indication that all the defendants are at fault;¹⁶⁷ moreover, courts are naturally

162. 33 Cal. 2d 80, 199 P.2d 1 (1948); see Phillips, *The Proposed Federal Product Liability Statute from the Toxic Tort Plaintiff's Perspective*, 28 VILL. L. REV. 1156, 1174 (1982-1983) (discussing effects of the proposed Uniform Products Liability Act on alternative liability theory). The bill, however, failed to get out of the Senate Commerce Committee on May 16, 1985. *Product Liability Bill Fails in Senate Committee*, in BNA CIVIL TRIAL MANUAL 244 (1985) [hereinafter cited as *Product Liability Bill Fails*].

163. 199 P.2d at 5.

164. Traditional tort concepts impose both the burdens of proof of causation and apportionment, which the plaintiff must establish by the preponderance of the evidence, upon the plaintiff. In *Summers*, however, the defendants had access to evidence and were in a better position to establish what happened. Kircher, *Federal Product Legislation and Toxic Torts: The Defense Perspective*, 28 VILL. L. REV. 1116, 1126 (1982-1983).

165. See PROSSER, *supra* note 16, § 41, at 271. The author suggests that imposing alternative liability in an instance of an innocent defendant would cause an injustice. *Id.*

166. The alternative liability theory will not assure the exposure victim of recovery in every case because of the possibility, however remote, that a defendant could exonerate himself or herself by showing that he or she did not cause the plaintiff's injury. Realistically, however, the odds of this eventuality are slim. See Rosenberg, *supra* note 6, at 856 n.28.

167. PROSSER, *supra* note 16, § 41, at 271.

disinclined to embrace the alternative liability theory when all possible defendants are not before the court.¹⁶⁸ In both instances, the courts' reluctance is probably attributable to a fear of deviating too far from the norm that a court cannot hold a defendant legally responsible for a plaintiff's harm without some causal relationship between the defendant's tortious conduct and the plaintiff's harm.¹⁶⁹ To be sure, the prospect of contravening this principle may be unacceptably high when a defendant may not be at fault, but simply cannot prove it, or when an alleged tortfeasor may not be before the court with the opportunity to exonerate himself or herself.¹⁷⁰ In many toxic substance or hazardous waste exposure situations, all defendants frequently may not be at fault or may not be present, and courts may consequently rebuff the alternative liability theory.¹⁷¹ This rebuff may very well foreclose an indispensable means of recovery for a toxic tort victim.

2. Concert of Action Theory

While the alternative liability theory may fall short of its desired goals in certain limited circumstances, another theory, the concert of action theory,¹⁷² may supplement alternative liability quite well. In fact, one writer has boldly postulated, "[d]efendants in environmental cases will be the next target of 'concert of action.'"¹⁷³

Probably the paradigmatic case employing the concert of action theory to overcome the type of causation problem generally prevalent in toxic tort litigation, identifying the responsible defendant, is *Bichler v. Eli Lilly & Co.*¹⁷⁴ In *Bichler* the focal point of the lawsuit was whether Eli Lilly could be held responsible to the plaintiff for cancer she allegedly developed as a result of her mother's consumption of DES, a drug manufactured and distributed by Eli Lilly and numerous other companies as a prophylactic to miscarriages and other pregnancy problems.¹⁷⁵ The complex problem confronting the plaintiff was the virtual impossibility of demonstrating that Eli Lilly manufactured the DES that her mother had ingested. This problem would undoubtedly have been a fatal shortcoming under the specific causa-

168. This joinder limitation has been impressed on the alternative liability rule. See *Namm v. Charles E. Frosst & Co.*, 178 N.J. Super. 19, 31-32, 427 A.2d 1121, 1127-28 (Super. Ct. App. Div. 1981); *Zazzali & Grad*, *supra* note 4, at 456 n.55.

169. *Kircher*, *supra* note 164, at 1119.

170. Moreover, a corresponding risk exists that the party who actually caused the injury may not be a party to the proceedings if all defendants are not before the court, which may work an injustice upon the party defendants.

171. An inherent problem of toxic tort litigation is the identification of the responsible parties. Given this difficulty, the limitations to alternative liability probably could not be overcome in many cases.

172. The concert of action theory has its genesis in the venerable common law rule that, if two or more defendants act pursuant to a common design, each of them is entirely liable for the tort actually committed by another. In theory, only one tort occurs, and that tort is chargeable to each member of the concerted action. See *PROSSER*, *supra* note 16, § 46, at 323.

173. Appleson, *Concert of Action Theory: Polluters Beware*, 68 A.B.A. J. 1209, 1209 (1982).

174. 55 N.Y.2d 571, 436 N.E.2d 182, 450 N.Y.S.2d 776 (1982).

175. Appleson, *supra* note 173, at 1209.

tion rationale,¹⁷⁶ but the court developed an innovative alternative under the rubric of concert of action to ease the causation burden. The court characterized the conduct of the DES manufacturers as "conscious parallelism,"¹⁷⁷ a type of concerted action that resulted in making any of the manufacturers liable for the plaintiff's entire damages despite the plaintiff's inability to identify the manufacturer of the drug taken by her mother.¹⁷⁸ Consistent with the original common law understanding of joint tortfeasor liability, the plaintiff was able to select any participant in the concerted activity and sue and recover without identifying the actual responsible party.

Applying the concerted activity theory specifically to the realm of environmental torts indubitably has a tremendous appeal to an exposure victim.¹⁷⁹ The concerted activity theory finesses the problem of the unidentifiable defendant. Critics have contended, however, that this device unduly undermines traditional tort principles and unwisely eviscerates the concept of causation from tort liability.¹⁸⁰

3. *Market Share Theory*

The policy underpinnings for the concert of action exception to the specific causation rule similarly undergird the market share theory. Namely, when the ability to identify the party responsible for the exposure has been significantly eroded by a protracted latency period or the generic resemblance of a product manufactured by a number of different entities, a court, facing a choice between denying compensation to a victim and imposing liability on a company that may not have caused the harm, should allow the injured party to recover.¹⁸¹ *Sindell v. Abbott Laboratories*¹⁸² was the seminal case utilizing the market share approach to accomplish this policy objective without requiring the plaintiff to establish the specific identity of the manufacturer of the DES that was actually ingested.

The difficulty that the plaintiff experienced in *Sindell* was strikingly similar to that experienced by the plaintiff in *Bichler*. The *Sindell* court, however, adopted a different tack to accomplish the desired result of providing compensation to the injured party. The *Sindell* court held that if the plaintiff

176. See Phillips, *supra* note 162, at 1173. The author theorizes that "liability only on the basis of actual cause . . . would require identification of the particular defendant." *Id.*

177. 55 N.Y.2d at 585, 436 N.E.2d at 188, 450 N.Y.S.2d at 782. Conscious parallelism has been defined as "acting the same way, pursuing the same goal." Appleson, *supra* note 173, at 1209.

178. Kircher, *supra* note 164, at 1124. The "drug companies had acted independently of each other in failing to do such testing, but . . . such independent actions had the effect of substantially aiding or encouraging the failure to test by the others." *Id.* at 1174 n.100.

179. The lawyer who successfully handled the *Bichler* case for the plaintiff has characterized the possible effect of the application of the decision to toxic tort litigation as follows: "The potential, my friends, is enormous." Appleson, *supra* note 173, at 1209.

180. Kircher, *supra* note 164, at 1124. "In their desire to fashion a solution to the identification problem facing toxic tort plaintiffs, courts have been rather creative in stretching the boundaries of tort law far beyond intended or logical limits." *Id.*

181. Schwartz & Means, *supra* note 153, at 1103-04.

182. 26 Cal. 3d 588, 607 P.2d 924, 163 Cal. Rptr. 132, *cert. denied*, 449 U.S. 912 (1980).

were successful in joining a substantial share of the DES manufacturers,¹⁸³ then the burden would shift to each defendant to show that it had not done anything to cause the plaintiff's injuries.¹⁸⁴ Each defendant that failed to exonerate itself faced liability on the basis of its proportionate share of the DES market;¹⁸⁵ thus, the court dispensed with the requirement of establishing which manufacturer specifically caused the plaintiff's harm.

Applying the market share analysis to toxic tort litigation leaves mixed feelings. That it may facilitate the plaintiff's causation burden in an otherwise impossible situation is clear. Dispensing with the specific causation requirement when the injured party simply joins a substantial share of the polluters would be a significant development in the area of environmental tort liability. The likelihood, to be sure, of a polluter's disproving the causal relationship between its conduct and the plaintiff's injury is virtually nil. Some pundits have questioned the market share theory, however, stating that it in essence permits "'Peter to be blamed for the harm caused by Paul'."¹⁸⁶ As a consequence, the argument continues, the market share theory tends to undermine severely the reasonable expectations of the defendants as to the extent of liability they will suffer for their conduct.¹⁸⁷ On the other hand, market share liability appears to be a sound expression of public policy. First, the innocent plaintiff who is uncertain about the party responsible for inflicting injury is not absolutely foreclosed from recovery. Second, the threat of market share liability can serve to deter a defendant from failing to exercise due care.¹⁸⁸ Third, liability only attaches in proportion to each firm's risk contribution.¹⁸⁹ This same argument applies with equal force to imposing market share liability upon those who commit environmental torts.¹⁹⁰ Thus, the market share theory of *Sindell*, as well as the

183. 26 Cal. 3d at 612, 607 P.2d at 937, 163 Cal. Rptr. at 145. The exact meaning of "substantial share" remains unclear, which affects the impact of the *Sindell* decision. *But see* *Murphy v. E.R. Squibb & Sons, Inc.*, 40 Cal. 3d 672, 684, 710 P.2d 247, 255, 221 Cal. Rptr. 447, 455 (1985) (drug manufacturer that sold 10% of DES nationwide did not have "substantial" share of market that would shift burden of proof on issue of causation to defendant). By joining a substantial share of the defendants in the lawsuit, the plaintiff theoretically enhances the probability that one of the joined manufacturers did in fact manufacture the DES that caused the plaintiff's injuries. In *Murphy* the court noted that the requisite level of probability was absent, stating that: "there is only a 10 percent chance that it produced the drug causing plaintiff's injuries, and a 90 percent chance that another manufacturer was the producer." *Id.*

184. 26 Cal. 3d at 612, 607 P.2d at 937, 163 Cal. Rptr. at 145.

185. The plaintiff presumably could only recover up to the total percentage of the defendants joined in the action. For example, if 90% of the manufacturers were joined, then only that percentage of the damages could be recovered. What happens in regard to the other 10% of the market and, hence, to the damages is unknown. In *Martin v. Abbott Laboratories*, 104 Wash. 2d 581, 689 P.2d 368 (1984), the court expressed strong apprehension that the market share concept announced in *Sindell* would lead to assignment of the unaccounted 10% to the parties before the court. 689 P.2d at 381.

186. *Schwartz & Means*, *supra* note 153, at 1104 n.70.

187. *Id.* at 1104; *see also* *Sheffield v. Eli Lilly & Co.*, 144 Cal. App. 3d 583, 192 Cal. Rptr. 870 (1983), *cited in* *Rosenberg*, *supra* note 6, at 868 n.70 (court refused to apply the market share theory).

188. *Rosenberg*, *supra* note 6, at 868.

189. *Id.*

190. *See id.* The author notes that courts have limited market share liability to generic products uniformly marketed by two or more manufacturers, but he states emphatically that

concert of action theory of *Bichler*, appear to be ripe for constructive utilization in toxic tort litigation.¹⁹¹

4. *Last Injurious Exposure Rule*

In the category of toxic torts involving harmful occupational exposures to toxic substances or hazardous wastes¹⁹² an innovative concept, the last injurious exposure rule, has been employed in workers' compensation cases to circumvent the difficulties present when a plaintiff is unsure of the exact cause of the disease.¹⁹³ This rule imposes liability on an employer when the plaintiff was last exposed to a hazardous material, bearing a causal relation to the plaintiff's disability, during employment.¹⁹⁴ The principle is not one based on greater probability,¹⁹⁵ but is actually a rule of convenience.¹⁹⁶ Consequently, as a matter of policy, this rule effectively serves to lessen, if not efface, the plaintiff's burden of proving legal causation.¹⁹⁷

Although the last injurious exposure exception has augmented the plaintiff's chances of recovery in occupational asbestos exposure cases, some policy considerations augur against its general utility. For example, a very significant risk exists that the rule can work to the disadvantage of an employer who was the injured employee's last employer, but for whom the employee worked only a relatively short period of time. Absent prescribed minimum lengths of time for employment, a palpably inequitable result can ensue in the case of the last, but short-term, employer.¹⁹⁸ Given this risk, some jurisdictions have implemented measures designed to protect an employer from being unfairly subjected to liability. Among these measures are statutory provisions establishing a minimum period of employment before

this limitation is not justified. The author provides the proper standard for ascertaining the propriety of applying market share analysis: "As long as liability is aligned with each firm's risk contribution, it is entirely appropriate for courts to apply the market share approach to apportion liability among manufacturers of variably defective and even different products." *Id.*

191. *But see* Epstein, *supra* note 94, at 1378-82 (points out fallacious nature of market share theory as now applied to tort law).

192. The primary types of toxic or hazardous exposures are occupational, environmental, and consumer product. Schwartz & Means, *supra* note 153, at 1094. The majority of claims have their genesis in an occupational setting. *Id.* Thus, "[w]orker's compensation . . . is, at present, the form of administrative remedy most often relied upon in cases of toxic substance poisoning." Soble, *A Proposal for the Administrative Compensation of Victims of Toxic Substance Pollution: A Model Act*, 14 HARV. J. ON LEGIS. 683, 714-15 (1977) (footnote omitted).

193. Note, *supra* note 24, at 1308.

194. *Id.* at 1309.

195. The factual circumstances underlying the application of the last injurious exposure rule do not meet either the "but for" or "substantial factor" tests for causation-in-fact. At best, the evidence simply establishes a causal link, falling short of the requirements for the concept of legal causation-in-fact. *See* Calabresi, *supra* note 14, at 72.

196. *See* Ringeisen v. Insulation Servs., Inc., 539 S.W.2d 621, 624 (Mo. Ct. App. 1976).

197. Note, *supra* note 24, at 1310. This substitute for specific causation ostensibly furthers the policy of enhancing the remedial goal of workers' compensation systems, that employees should recover for those injuries arising out of and in the course of employment. To this end, the last injurious exposure rule virtually obviates the plaintiff's burden of showing a causal connection between the work and the injury. *Id.*

198. *See* Mathis v. State Accident Ins. Fund, 10 Or. App. 139, 499 P.2d 1331, 1336 (1972).

liability can be imposed upon an employer¹⁹⁹ or permitting employers to require medical examinations for potential employees, thus increasing the likelihood of screening out those prospective employees who already have disabling workplace-related illnesses.²⁰⁰

The last injurious exposure rule is limited to a special disease (asbestos-related ailments), a special place (the occupational environment), and a special forum (workers' compensation). This combination of factors probably accounts for the courts' willingness to adopt an extremely ersatz rule of causation. Even in this narrow context, however, courts and lawmakers have carved out limitations to avoid imposing unfair liability upon an employer, indicating the uneasiness associated with this substitute for specific causation. Thus, one cannot reasonably conceive of the last injurious exposure rule, or a variant thereof, being transferred to other areas of toxic or hazardous exposure, such as environmental or consumer product cases. The last injurious exposure rule seems factually ill-suited for environmental or consumer product cases, and more importantly, policy considerations seem to militate against its application. The need to protect the defendant from unwarranted liability in instances of environmental exposure or consumer product exposure resulting from the invocation of the last injurious exposure rule probably overshadows the interest in allowing an innocent plaintiff to recover.²⁰¹ Thus, the rule has little utility in environmental or consumer product exposure areas and courts have accordingly restricted its application to a small sphere of toxic tort litigation.

5. *Enterprise Liability Theory*

Courts have occasionally used the novel approach of enterprise liability in an effort to help plaintiffs meet the causation burden of proof.²⁰² The pioneer case in this area is *Hall v. E.I. Du Pont de Nemours & Co.*²⁰³ In *Hall* some exploding blasting caps injured the plaintiffs, who later sued several

199. IDAHO CODE § 72-439 (1973) (60 days); IND. CODE ANN. § 22-3-7-33(a) (Burns 1974) (60 days in asbestos exposure cases); PA. STAT. ANN. tit. 77, § 1401(g) (Purdon Supp. 1986) (6 months).

200. Note, *supra* note 24, at 1309.

201. A strong policy favors the compensation of employees for work-related injuries. In support of this policy, states have enacted workers' compensation laws that generally dispense with the requirement of proving fault and disallow the defenses of assumption of the risk, contributory negligence, and the fellow servant rule. 1 A. LARSON, *supra* note 114, § 4.50 (1985). Moreover, causation requirements have traditionally been relaxed in the workers' compensation area. See R. EPSTEIN, C. GREGORY & H. KALVEN, JR., CASES AND MATERIALS ON TORTS 918 (4th ed. 1984). Add to this the fact that courts are now very aware of the health and environmental risks of asbestos within the narrow confines of the workplace, and the reason why courts have liberally applied the last injurious exposure to work-related asbestos injuries becomes evident. That the rule will likely be restricted to this factual context, however, is equally apparent.

202. The Federal Product Liability Act, proposed by Senator Kasten, may adversely affect the concept of enterprise liability. Phillips, *supra* note 162, at 1173. For the time being, however, this concern is moot because Senator Kasten's bill failed to get out of the Senate Commerce Committee, on a tie vote, in May 1985. *Product Liability Bill Fails*, *supra* note 162, at 244.

203. 345 F. Supp. 353 (E.D.N.Y. 1972).

manufacturers of the blasting caps. The plaintiffs faced a dilemma common in cases of this nature: they could not identify the manufacturer of the blasting caps that actually caused them harm. As a consequence, the plaintiffs sued a limited number of defendants who manufactured blasting caps under "substantially similar industry-imposed safety standards."²⁰⁴

Under the enterprise liability theory espoused in *Hall*, the industry-wide standard caused the injury, so that each defendant that used the standard contributed to and was liable for the plaintiff's injury.²⁰⁵ Enterprise liability thus is a hybrid theory combining elements of alternative liability and concert of action.²⁰⁶ The court in *Hall*, however, imposed restraints upon the enterprise liability theory by ostensibly limiting its application to those situations not involving a large number of companies in the particular industry.²⁰⁷ Hence, one must consider not only the substantive elements of the enterprise liability theory,²⁰⁸ but also its practical limitations in determining the full extent of its applicability to the area of toxic tort litigation. To date, the courts have not specifically embraced enterprise liability in an environmental tort case. In fact, courts have specifically rejected enterprise liability in DES exposure litigation, primarily because the nature of the DES industry does not lend itself to the imposition of industry-wide, or enterprise, liability.²⁰⁹

Some indication exists, however, that toxic substance injuries resulting from exposure to air or water contaminants may invite the application of the enterprise liability theory. In fact, the court in *Hall* alluded to this possibility.²¹⁰ The extension of this theory of joint liability to those cases of air or water pollution involving an industry composed of a small number of units and pollution that is truly an enterprise risk seems reasonable.²¹¹ Surely, industries can most effectively guard against air and water pollution; this is a compelling reason for applying enterprise liability.²¹² No court decisions, however, have unequivocally reached this conclusion. Moreover, whether *Hall*, in its present unadulterated state, would apply to enterprise liability in

204. *Collins v. Eli Lilly Co.*, 116 Wis. 2d 166, 342 N.W.2d 37, 47 (1984) (discussing *Hall v. E.I. Du Pont de Nemours & Co.*).

205. *Id.*

206. Phillips, *supra* note 162, at 1173 n.99.

207. 345 F. Supp. at 378; see Note, *Causation*, *supra* note 38, at 673. The existence of a large number of companies undermines the inference that there was industry-wide control of the risk, the principal basis of the enterprise theory of joint liability.

208. To establish the enterprise liability theory, one must demonstrate that: "(1) plaintiff's injury is the result of a business generated risk, (2) the risk is best ascertained by the industry working together or through trade associations, and (3) the risk is best resolved or avoided by the industry working together." Note, *Causation*, *supra* note 38, at 673.

209. See *Collins v. Eli Lilly Co.*, 116 Wis. 2d 166, 342 N.W.2d 37, 47 (1984); *Sindell v. Abbott Laboratories*, 26 Cal. 3d 588, 609, 607 P.2d 924, 935, 163 Cal. Rptr. 132, 143, *cert. denied*, 449 U.S. 912 (1980). The principal basis for rejecting the enterprise liability theory in *Collins* and *Sindell* was that a large number of drug companies composed the DES industry. *Collins*, 342 N.W.2d at 47; *Sindell*, 26 Cal. 3d at 609, 607 P.2d at 935, 163 Cal. Rptr. at 143.

210. See 345 F. Supp. at 377; Note, *Causation*, *supra* note 38, at 674.

211. Acid rain is a type of air pollution that may be within the pale of the enterprise liability theory. See Note, *Causation*, *supra* note 38, at 673-75.

212. See 345 F. Supp. at 377.

a water or air pollution context is unclear, notwithstanding suggestive dictum to that effect.²¹³ Thus, the law on this point is not as well-stated as *Hall* might give one reason to believe. The status of the enterprise liability theory as a practical alternative to the traditional tort element of causation in fact remains dubious.

6. *The Duration and Intensity Theory*

Another ingenious method of imposing liability for toxic exposure injuries when no proof of legal causation exists is the duration and intensity theory.²¹⁴ The fundamental premise of this theory is that to avoid establishing specific causation the plaintiff need only show that the "aggravation of the disease or . . . the exposure was of such duration and intensity that it generally causes the disease in question, even though actual causation or aggravation cannot be established in the claimant's case."²¹⁵ Clearly, this principle, which originated in *Caudel-Hyatt, Inc. v. Mixon*,²¹⁶ an asbestos-related workers' compensation case, spurns the possibility of foreclosing a victim of an asbestos-related illness from recovering because of inability to meet the difficult, if not impossible, burden of proving actual causation. Instead, the plaintiff needs to prove only the duration and intensity of the exposure.²¹⁷

Misgivings arise as to the effectiveness of the duration and intensity approach as a palliative to the traditional tort causation rule in the broad spectrum of toxic or hazardous exposure cases. The less demanding duration and intensity test may be palatable in the well-understood area of asbestos-related maladies.²¹⁸ Consequently, courts may be more receptive to assuasive devices that circumvent the harsh ramifications of specific causation in these exposure cases, for more is known about the etiology of asbestos-related diseases, and correspondingly less has to be shown with respect to causation to convince a court of the merits of recovery. To the contrary, scientific uncertainty still pervades most other hazardous waste or toxic substance exposure injuries. Thus, in these types of toxic torts, courts may reject a lenient approach like the duration and intensity theory.²¹⁹ Even if courts do not totally reject this theory, plaintiffs would have a greater burden of proving duration and intensity of exposure than plaintiffs in asbestos cases.²²⁰

213. *Id.* Using *Hall* as authority presents a problem, however, in that the cases that the *Hall* court cites to support application of the enterprise liability theory to air and water pollution are not enterprise liability cases. Note, *Causation*, *supra* note 38, at 674.

214. Note, *supra* note 24, at 1312.

215. *Caudle-Hyatt, Inc. v. Mixon*, 220 Va. 495, 260 S.E.2d 193, 196 (1979).

216. *Id.*

217. Note, *supra* note 24, at 1311.

218. *Id.* at 1312.

219. Scientific uncertainty about the effects of such hazardous substances as dioxin and Agent Orange on human health and the environment prevents analysis under the duration and intensity test of exposures from these substances even though dioxin and Agent Orange have some well-known reputed effects. *In re Agent Orange Prod. Liab. Litig.*, 597 F. Supp. 740, 782 (E.D.N.Y. 1984); *U.S. v. Vertac Chem. Corp.*, 489 F. Supp. 870, 885 (E.D. Ark. 1980).

220. Note, *supra* note 24, at 1313. In addition to the more onerous requirement with re-

7. Proportionality Rule

Another alternative to traditional tort causation principles is causation established on the basis of the proportionality rule, a species of comparative causation.²²¹ Under this alternative to specific causation manufacturers or other generators of toxic substances or hazardous wastes are liable for injury to the exposure victim in proportion to the damage caused by the tortious conduct of each.²²² The practical utility of the proportionality rule is two-fold. First, this rule dispenses with the traditional common law rule that requires the plaintiff to establish causation-in-fact by the preponderance of the evidence.²²³ Under the proportional liability rule courts can impose liability and grant compensation in proportion to the causation probability of the excess disease risk²²⁴ in the affected population. Courts need not consider whether the causation probability is above or below the fifty-percent threshold or if an individual plaintiff proved a causal connection.²²⁵ Second, the proportionality rule resolves the causal indeterminacy problem in mass exposure cases.²²⁶ Exposure victims can recover for some of their injuries even though they may not know the substance causing their disease or the identity of the responsible party.²²⁷ Eliminating the preponderance of the evidence rule and requirements of specific causation in toxic or hazardous exposure cases will further the goals of tort law. Allowing a plaintiff to recover without establishing a causal probability in excess of fifty percent, while, at the same time, not having to offer particularized proof of causation removes a formidable barrier to recovery. In so doing, the proportionality rule advances the traditional tort law goals of compensation, deterrence, and corrective justice.²²⁸ The proportionality rule may very well be an appropriate response to the causation conundrum.²²⁹ The rule simply revamps current tort thinking, and, in so doing, perhaps offers a viable alternative to

spect to duration and intensity in hazardous waste cases, under this theory a plaintiff still must prove the identity of the party "who disposed of the specific harm-producing chemical." *Id.*

221. Rosenberg, *supra* note 6, at 866.

222. *Id.*

223. PROSSER, *supra* note 16, § 38, at 239. A highly artificial, sometimes unfair, situation commonly characterized as the all-or-nothing causation rule has developed under the preponderance of the evidence rule. Essentially the plaintiff wins if he demonstrates that the probability of causation exceeds fifty percent, but loses completely if the probability is fifty percent or less. This system does not appear to foster accepted tort objectives.

224. Excess disease risk means the "disease incidence attributable to the 'excess risk' created by the toxic agent" in question, in contrast "to the 'background risk'—the cumulative risk attributable to all other factors." Rosenberg, *supra* note 6, at 857.

225. *Id.* at 859.

226. *Id.* at 866.

227. Normally, these are the thorniest problems confronting a toxic or hazardous tort exposure victim. See *supra* notes 143-47 and accompanying text.

228. See Robinson, *Probabilistic Causation and Compensation for Tortious Risk*, 14 J. LEGAL STUD. 779, 783-91 (1985); see also Rosenberg, *supra* note 6, at 866 (rule enables system to achieve optimal deterrence objective). But see Elliott, *Why Courts? Comment on Robinson*, 14 J. LEGAL STUD. 799, 804-05 (1985) (endorses probabilistic causation approach, but eschews goal analysis of Robinson in preference for an institutional analysis).

229. See Laub, *The Application of Enterprise Liability to Asbestos-Related Litigation*, 17 TRIAL 58 (1981); Rosenberg, *supra* note 6, at 866-68, 881-87.

abandoning the tort system.²³⁰

8. Other Possible Modifications of the Specific Causation Rule

a. *Sliding Scale Concept.* A few lesser known, but provocative, alternatives have also been advanced to alleviate the harshness of the specific causation principle. One of these alternatives is the sliding scale concept. Under this approach, the degree of proof required to establish causation varies with the risks and benefits of the allegedly harmful activity.²³¹ Thus, if the activity entails some extraordinarily great risks with concomitantly miniscule societal benefits, then the burden of proof on the issue of causal connection is relaxed.²³² Conversely, an activity involving highly important social benefits with correspondingly lower attendant risks will probably result in the imposition of more stringent proof requirements for causation.²³³

Although at first blush this sliding scale or risk-benefit theory of causation seems to present a solution to the causation problem in the field of toxic torts, serious reflection reveals that the theory is not a solution. The troublesome areas include: (1) the inherent difficulty for the courts to make reasonably precise determinations of cost-benefit and risk-benefit ratios in convoluted environmental tort cases,²³⁴ and (2) the propensity of injured parties to fabricate the degree of the risk involved in an attempt to ensure that courts will apply a lower burden of proof on causation issues in the litigation.²³⁵ This theory undermines the torts process in two significant aspects: first, the arduous task of precisely measuring and balancing risks against benefits inherently entails the strong possibility of error by a court;²³⁶ second, the injured party's tendency to exaggerate the magnitude of

230. Rosenberg, *supra* note 6, at 928. The possible virtue in overhauling the tort system as opposed to totally abandoning it is that the tort system is both well-tested and well-proven. Hence, it "may nevertheless be serviceable for the time being—with the installation of some modern equipment." *Id.* at 929. See *infra* notes 291-92 and accompanying text for a contrary view.

231. Trauberman, *supra* note 19, at 225.

232. *Id.*

233. On its face, the sliding scale or risk-benefit approach to causation seems workable. For years courts have engaged in some form of risk-benefit analysis to establish negligence under tort law, see, e.g., *United States v. Carroll Towing Co.*, 159 F.2d 169, 173 (2d Cir. 1947), or to ascertain whether certain activity constitutes a nuisance, see, e.g., *Copart Indus., Inc. v. Consolidated Edison Co.*, 41 N.Y.2d 564, 572, 362 N.E.2d 968, 974, 394 N.Y.S.2d 169, 175 (1977) (Fuchsberg, J., dissenting) ("[n]uisance traditionally requires that, after a balancing of the risk-utility considerations, the gravity of harm to a plaintiff be found to outweigh the social usefulness of a defendant's activity"). In nuisance actions this balancing is generally apposite to the question of whether a use or activity is reasonable, a fundamental question in this area of tort law. The issue of social utility versus risk likewise arises in the context of injunctive relief sought in connection with nuisance actions. See *Spur Indus., Inc. v. Del E. Webb Dev. Co.*, 108 Ariz. 178, 494 P.2d 700, 706-08 (1972); *Boomer v. Atlantic Cement Co.*, 26 N.Y.2d 219, 224-26, 257 N.E.2d 870, 872-73, 309 N.Y.S.2d 312, 315-17 (1970). These two cases illustrate the application of risk-benefit analysis in nuisance law. The primary remedial question in both cases was the propriety of either injunctive relief or damages. In view of the case law, an activity may be unreasonable for the purpose of awarding damages, although injunctive relief is not available because of the activity's great social utility.

234. Trauberman, *supra* note 19, at 225.

235. *Id.* at 224.

236. In environmental law, for example, in which risk-benefit analysis is commonly used, a

the particular risk leads to the untenable situation of an innocent party quite possibly being saddled with a loss that he or she did not cause. This injustice can easily occur when a court possesses less than the desired level of competence to perform its task so that exaggerated claims of great risks easily sway the court, effectively relaxing the plaintiff's burden of proof with respect to causation.²³⁷ The sliding scale approach to causation is fraught with both scientific and legal uncertainty. Although the approach works to the advantage of the exposure victim, its advantages are unacceptably low when compared to its possible detriment.²³⁸

b. Inferences and Presumptions. Permissible inferences and presumptions, or mandatory inferences, have traditionally been employed to facilitate the plaintiff's burden of proof in a variety of instances.²³⁹ Between the two, perhaps presumptions are potentially more useful to the exposure victim in a toxic tort case.²⁴⁰ A major complication in toxic tort litigation is establishing the causal connection between hazardous substance exposures and later manifested injuries.²⁴¹ Of prime concern is whether a presumption of causation is an appropriate method of alleviating this problem. Since shifting the burden of going forward to the defendant, the normal procedural effect of a presumption, enhances the likelihood of compensation,²⁴² the toxic tort victim should welcome presumptions as a valuable tool. Moreover, if this bur-

frequent criticism is the imprecision associated with evaluating the risks and correlative benefits of the environmentally questioned activity. *See Risk-Benefit Analysis Is Key Tool in U.S. Regulation of Chemicals: EPA Is Divided Over Accuracy of Technique*, Washington Post, Jan. 3, 1985, at A-6, col. 1 (EPA concedes that its method of risk assessment is of dubious validity in some respects regarding toxic substances).

237. Trauberman, *supra* note 19, at 226. A third concern about the sliding scale approach is the propriety of increasing the difficulty of recovery for an exposure victim simply because he or she is harmed by a socially advantageous activity. *Id.*

238. Perhaps a slightly more feasible, yet somewhat similar, theory for assuaging "the causation problem is to assess the risk of harm to a group of persons exposed to a chemical and provide fractional recoveries to the entire group." *Id.*

239. In the law of torts the doctrine of *res ipsa loquitur*, normally a form of circumstantial evidence of negligence, gives rise to a permissible inference of negligence in some jurisdictions or a mandatory inference, presumption, in others. W. PROSSER, J. WADE & V. SCHWARTZ, *CASES AND MATERIALS ON TORTS* 278 (7th ed. 1982). A presumption shifts the burden of going forward to the defendant, and, in a few jurisdictions, actually shifts the burden of persuasion, as well as the burden of going forward, to the defendant. *Id.*

240. Permissible inferences are simply those inferences that the jury is permitted, but not required, to draw from a given set of facts. These inferences do not, therefore, shift any burden to the defendant. In the specific context of toxic tort litigation, with the high level of scientific uncertainty invariably involved, a mere permissible inference does not greatly enhance the plaintiff's chances of hurdling the causation barrier. As a practical matter, however, a permissible inference can get the issue of causation to the jury, thus avoiding a directed verdict and, at least theoretically, augmenting the likelihood of recovery. *See* PROSSER, *supra* note 16, § 40, at 259. On the other hand, a presumption or mandatory inference has a stronger procedural effect. It normally shifts the burden of going forward to the person against whom it operates. If the party with the burden of going forward fails to rebut the presumption, that party generally loses.

241. The tort system thus is inadequate for dealing with mass or toxic exposures. *See supra* notes 115-18 and accompanying text. "Our inability to compensate pollution victims lies mainly within our present tort law system. It was not developed with the aim of providing compensation for all damages." Note, *supra* note 7, at 926.

242. T. SCHOENBAUM, *supra* note 26, at 604.

den shifting should tend in some way to elevate the credibility of epidemiological proof in establishing the requisite causal connection in toxic tort litigation, then, here again, this shift will be an exceedingly significant development toward securing adequate victim compensation.²⁴³ Specifically, epidemiological evidence that reflects a rise in the incidence of the exposure victim's disease in the exposed population at the rate of fifty percent may be sufficient to raise a presumption that the exposure in question caused the particular victim's disease. This *prima facie* case of causation effectively shifts the burden of going forward on the issue to the defendant. Because, as a practical matter, the causation question is thorny for whoever shoulders the responsibility, a defendant suddenly saddled with the rebuttal burden may be unable to meet it. Failing this, the toxic tort victim may prevail regarding causation on the basis of epidemiological evidence that heretofore would generally have been patently insufficient. More significantly, the exposure victim will avoid the responsibility of establishing specific causation, the bane of almost every toxic exposure victim seeking compensation today.²⁴⁴ The spectre of this eventuality understandably intimidates some individuals.²⁴⁵

From a policy perspective the real issue underlying the presumption/causation controversy is the proper allocation of the risk of loss in toxic tort exposure cases.²⁴⁶ In view of current social and economic conditions in

243. See *id.* To date, however, courts have not given epidemiological proof much credence in the causation issue. See Note, *supra* note 1, at 584.

[T]he evidence may show a statistical increase in the occurrence of [t]his disease in a population exposed to the toxic substance. But such evidence says little about the cause of the plaintiff's particular injury: Unless that statistical increase is greater than 100%, his injury probably was *not* caused by the exposure, and he will recover nothing.

Id. at 583-84 (emphasis in original).

244. If the defendant fails to adduce sufficient evidence to overcome the presumption of causation, then, generally, the plaintiff exposure victim has established causation by a preponderance of the evidence. Note, *supra* note 1, at 584 n.32. Some opposition to using presumptions to alleviate the exposure victim's causation burden exists. As one report concluded:

The use of presumptions to aid a plaintiff's proof of causation in toxic exposure cases is highly controversial. Advocates believe presumptions enable claimants to make their case despite the absence of clear medical evidence regarding the cause of an illness. Opponents believe presumptions should not be employed when the cause of an illness is medically attributable to more than one source or is unknown. These positions reflect two very different views toward the role presumptions should play in a trial. Those favoring presumptions believe they should be used to resolve doubt in favor of an injured individual. Opponents believe they should not be used to resolve issues legitimately in doubt but only to remove barriers created by practical problems of proof such as the excessive cost of amassing pertinent scientific data.

AMERICAN ENTERPRISE INSTITUTE FOR PUBLIC POLICY RESEARCH, LEGISLATIVE ANALYSIS NO. 45, TOXIC TORTS: PROPOSALS FOR COMPENSATING VICTIMS OF HAZARDOUS SUBSTANCES 19 (1984).

245. AMERICAN ENTERPRISE INSTITUTE FOR PUBLIC POLICY RESEARCH, *supra* note 244, at 19 (argument that courts should not employ presumptions when cause of an illness is attributable to more than one source or is unknown).

246.

Without presumptions, plaintiffs have an extremely difficult time meeting traditional requirements of proving that a particular substance was in fact the cause of the illness. Similarly, however, a defendant will probably be just as unable to

our society²⁴⁷ the policy pendulum should swing in favor of the exposure victim who is in a less favorable position to protect himself or herself from the exposure and, moreover, generally possesses fewer resources to bear the costs of the loss ensuing from the harmful exposure. The use of presumptions to assuage the causation problems of an exposure victim will foster the tort goals of compensation, deterrence, and corrective justice between the parties.

c. *Class Action Mechanism.* The scientific, medical, and legal problems associated with establishing causation in toxic tort litigation pose a major pragmatic concern for the exposure victim: the astronomical costs that one must incur simply to litigate the causation question.²⁴⁸ The prospect of staggering litigation costs, including attorney's fees, may have the untoward effect of denying many meritorious exposure claims access to the courts on the basis of sheer economics.²⁴⁹ The class action mechanism may be an appropriate method of making the causation determination in toxic tort cases a financially feasible undertaking for exposure victims.²⁵⁰ Rather than having to replicate a number of costly individual determinations of causation, the class action approach allows the consolidation of a number of generically related cases, quite possibly resulting in tremendous resource savings.²⁵¹

Nevertheless, the apparent attractiveness of the class action apparatus to ameliorate costs attendant to litigating the causation question in the field of toxic torts is not universally accepted. Courts invariably decline to permit the certification of class actions in mass tort cases.²⁵² The principal explana-

prove the substance was *not* the cause, so that overcoming a presumption can be difficult and can mean the defendant will bear the cost of the inability to prove causation.

Id. at 20 (emphasis in original).

247. Several social and economic conditions call for a policy tilted in favor of the exposure victim. First, human exposure to hazardous or toxic wastes is one of the most pressing health and environmental concerns in society today. Second, making the prospect of liability for victim compensation more likely is a method for deterring those who might indiscriminately create hazardous exposure risks by violating waste management laws. Finally, because of a polluter's ability to externalize costs, pollution is actually an economically efficient activity without the deterrent effect of granting victim compensation. See Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244-45 (1968).

248. The number of scientists, epidemiologists, and field and laboratory studies required to establish causation demonstrate that a vast investment of money, time, and human resources is generally unavoidable. See SUPERFUND SECTION 301(e) STUDY GROUP, SENATE COMM. ON ENV'T & PUB. WORKS, INJURIES AND DAMAGES FROM HAZARDOUS WASTES—ANALYSIS AND IMPROVEMENT OF LEGAL REMEDIES, S. REP. NO. 12, 97th Cong., 2d Sess. (1982).

249. As alternatives to the traditional tort system, compensation systems that skirt scientific uncertainty have the potential to be much less expensive, cumbersome, and time-consuming. See Abraham & Merrill, *Scientific Uncertainty in the Courts*, 2 ISSUES SCI. & TECH. 93, 106 (1986). Defendants have a decided advantage in this situation because once they develop the issue of causation, that evidence can be used in subsequent cases. Redundancy for defendants is, for the most part, economically efficient.

250. Rosenberg, *supra* note 6, at 908. "Class treatment of mass exposure claims would enable plaintiff attorneys to achieve the same economies of scale that defendants already enjoy." *Id.*

251. *Id.*

252. *Id.*; see *Allen v. United States*, 588 F. Supp. 247, 258 (D. Utah 1984). Courts generally have evinced an aversion to the class action apparatus. See, e.g., *Zahn v. International*

tion given for the courts' reluctance is that class actions treat claims in a mass production manner that fails to recognize differences among claimants.²⁵³ This reasoning, however, may be inapposite to the causation issue in toxic tort cases because particularized evidence with significant probative value seldom exists in an individual case.²⁵⁴ The likelihood of a court's not being appropriately sensitive to the differences in the cases, therefore, is virtually nil because usually no real distinctions exist. The cases are virtually the same in terms of the difficulty of proving causation. Given the arduousness of establishing causation and the vast expenses associated with the effort, class actions thus may be an economically prudent way to marshal scarce resources in an assault upon this problematical aspect of toxic tort litigation.²⁵⁵

D. The Medical Causation Issue

1. General Discussion of the Salient Aspects of Medical Causation

As one commentator has noted, scientists find identifying the precise cause of toxic tort injuries extremely difficult.²⁵⁶ In addition to the troublesome question of legal causation, one must wrestle with another component of the causation calculus in toxic tort litigation: the medical causation factor. Causal uncertainty and indeterminacy greatly undermine the assessments of medical scientists.²⁵⁷ For this reason, medical causation theory has drifted from the well-nigh impossible task of establishing causation by direct evidence to a position that focuses upon risk assessment and probabilities of causation.²⁵⁸ Inferences of causation arise from epidemiological or toxico-

Paper Co., 414 U.S. 291, 292-93 (1973) (each member of class must assert a claim for damages exceeding \$10,000); *Snyder v. Harris*, 394 U.S. 332, 338-39 (1969) (same); *Mullane v. Central Hanover Bank & Trust Co.*, 339 U.S. 306, 318-20 (1950) (if address can be obtained, notice to absent class members must be sent by first class mail); *Eisen v. Carlisle & Jacquelin*, 391 F.2d 555, 560-61 (2d Cir. 1968), *rev'd*, 479 F.2d 1005, 1101-02 (2d Cir. 1973), *vacated*, 417 U.S. 156, 175 (1974) (named plaintiffs must pay cost of giving notice to all potential plaintiffs). The foregoing requirements make some class actions impossible, or at least costly, to maintain.

253. *Rosenberg*, *supra* note 6, at 909.

254. *Id.*

255. *Id.* at 910 n.230. "Given the cost and complexity of the causal connection question . . . —a question common to every claim arising from a particular mass exposure—it is doubtful that redundant litigation would be less expensive than convening and supervising the class." *Id.*; see also AMERICAN ENTERPRISE INSTITUTE FOR PUBLIC POLICY RESEARCH, *supra* note 244, at 22 (states should remove procedural barriers preventing multiple plaintiffs from joining in one suit to enable plaintiffs to share litigation costs). Allowing plaintiffs to join in a class action could alleviate the most formidable barrier to recovery in toxic tort litigation, proof of legal causation. G. NOTHSTEIN, TOXIC TORTS: LITIGATION OF HAZARDOUS SUBSTANCE CASES § 23.07, at 693-94 (1984).

256. Note, *supra* note 23, at 810. This problem of proving causation stems from a variety of factors including latent manifestation of injuries, epidemiological uncertainty, and the frequent confluence of multiple causes of injuries. *Id.* at 810-12.

257. See *id.* at 821.

258. *Id.* Courts have used the concept of risk assessment to establish the requisite causal relation for injunctive relief, even though the risk was remote and uncertain. *Reserve Mining Co. v. EPA*, 514 F.2d 492, 520-24 (8th Cir. 1975); *United States v. Vertac Chem. Corp.*, 489 F. Supp. 870, 886-87 (E.D. Ark. 1980). In *Vertac Chemical*, the court used the risk assessment approach to establish the "imminent and substantial endangerment" test of RCRA, 42 U.S.C. § 6973 (1982).

logical studies that statistically establish a likely causal relationship between the exposure and the harm.²⁵⁹ Unfortunately, the statistical cause and effect relationship established by such scientific evidence is uncertain to a degree generally considered to be unacceptable in the field of legal causation.²⁶⁰

2. *Melding Legal and Medical Causation*

Because the proof of a scientifically valid relationship does not always meet the legal causation standard, courts may, and sometimes do, reject proffers of proof consisting of scientific data that may establish medical causation, but fall short of the standards for legal causation.²⁶¹ This disaccord in the association of science and law prevents plaintiffs from establishing causation.²⁶² Perhaps some kind of reform should be instituted to modify the concept of legal causation to bring it in line with the realities of medical causation.²⁶³ Specifically, utilizing the scientifically inspired probability of causation approach to allow plaintiffs to establish legal causation on the basis of evidence reflecting causation probabilities of fifty percent or less will greatly enhance the exposure victim's chances of recovery. More importantly, however, such an approach squarely confronts the reality of the complexity and uncertainty of proof in toxic tort litigation in which the degree of certainty required under current legal causation principles is virtually impossible to achieve.²⁶⁴ If scientific, that is, medical, principles of causation are used to supplement the concept of legal causation, this interrelationship of law and science will strengthen the exposure victim's ability to establish the requisite causal relationship between exposure and harmful injury.²⁶⁵ Bridging the gap between legal causation and medical causation is undeniably a sound means to smooth the exposure victim's otherwise rocky causation

259. See Note, *supra* note 23, at 820. "[B]efore risk assessment can be conducted two critical components must be satisfied. First, the toxicity of the substance must be measured and, second, the extent of human exposure to the substance must be established." *Id.* at 817.

260. *Id.* at 814. "This gap between the medical acceptance of some uncertainty in causation and legally certain causation is itself a major obstacle to recovery in a hazardous waste injury suit." *Id.* at 825. Unlike medical causation, tort law does not countenance causal uncertainty. The mere possibility of causation is not enough to establish legal causation, although this possibility may be adequate to establish medical causation. *Id.* at 821-22. Thus, "[i]f an expert witness fails to testify to a reasonable medical probability of causation, the plaintiff will suffer a directed verdict or fail to convince a jury that legal causation exists." *Id.* at 832. Reasonable medical probability or certainty is, therefore, coterminous with the preponderance of the evidence standard. McElveen & Eddy, *supra* note 23, at 47.

261. Note, *supra* note 23, at 825; see *Alvarez v. United States*, 495 F. Supp. 1188, 1206 (D. Colo. 1980); *Szczepaniak v. United States*, No. 80-990, slip. op. (D. Mass. Mar. 2, 1983); *Caudle-Hyatt, Inc. v. Mixon*, 220 Va. 495, 260 S.E.2d 193, 196 (1979).

262. Note, *supra* note 23, at 825. "[A] gap exists between medical acceptance of causation and legal acceptance in case law which makes proof of legal causation nearly impossible, through no fault of the injured party." *Id.* at 842.

263. *Id.* at 844 (proposes modification of legal causation concept to align with medical realities of hazardous waste injuries).

264. See Note, *The Burden of Proof*, *supra* note 19, at 207-08.

265. The mere probability of a causal association between the exposure and the injury will therefore suffice to establish legal causation; this will greatly diminish the onus on the exposure victim and, as importantly, elevate scientific data to a more respected position in proving causation in toxic tort litigation.

road, and thus, it would represent a prudent policy step toward the adequate compensation of victims of exposure to toxic substances or hazardous wastes.

E. The Future Interdisciplinary Roles of Law, Medicine, and Science in Resolving the Toxic Tort Causation Conundrum

Toxic substance and hazardous waste exposure torts present extraordinary scientific, medical, and legal problems.²⁶⁶ Thus, by force of circumstances, society should give serious thought to developing the framework for an effective interrelationship between law, medicine, and science to address squarely the causation question in toxic tort litigation.²⁶⁷ Because toxic tort litigation is invariably hybrid in nature,²⁶⁸ any problem-solving forum, be it judicial, administrative, or legislative implicates a number of perspectives.²⁶⁹ The formidable challenge is synthesizing the causative concepts of law, medicine, and science to fashion a workable theory of causation for toxic tort litigation. Such a theory should vindicate the tort law goals of compensation, deterrence, and corrective justice between the parties.²⁷⁰

The development of a proper theoretical framework to address causation issues in toxic tort cases is urgent.²⁷¹ To ameliorate the harshness of the causation requirement, significant, but not radical, changes must be incorporated into the proof calculus. In the context of law, medicine, and science,

266. Note, *supra* note 23, at 797.

267. Ironically, the interrelationship of science and law can further obstruct plaintiffs from properly establishing causation so as to prevent compensation for injuries from exposure to hazardous wastes. *Id.* at 825. The major premise of the commentator's conclusion is that scientific evidence of causation, grounded invariably upon experimentation, is always vulnerable to conflicting expert testimony and health studies. Moreover, even if scientific evidence qualifies to establish the requisite "association between exposure and injury . . . tort law may ignore scientific proof if the standards of legal causation are not satisfied." *Id.*; see also McElveen & Eddy, *supra* note 23, at 49 (disparity between determinations of medical and legal cause tends to exacerbate difficulties attendant to establishing causation in toxic tort cases).

268. Garrett, *Compensating Victims of Toxic Substances: Issues Concerning Proposed Federal Legislation*, 13 ENVTL. L. REP. (ENVTL. L. INST.) 10172, 10174 (1983). Viewing medicine as a distinct component of the toxic tort liability equation is perhaps more accurate because in any area fraught with scientific uncertainty, which, of course, the field of toxic torts is, the practice of medicine is in many ways an art and not truly a science. See McElveen & Eddy, *supra* note 23, at 66. Thus, a multidimensional approach, involving law, medicine, and science, is required to address adequately the problem of causation.

269. Garrett, *supra* note 268, at 10174. Some writers have seemingly failed to display the requisite level of appreciation for scientific and medical influences upon the causation question in the toxic tort field. See Rosenberg, *supra* note 6, at 855-59.

270. In view of the unique character of toxic tort litigation, traditional legal causation principles, divorced from medical and scientific considerations, are not fully capable of achieving these objectives.

271.

Probably the most important element in toxic tort cases is causation. Even if the plaintiff has succeeded in demonstrating that he has been exposed to the defendant's hazardous substance, he may have considerable difficulty in demonstrating that this exposure has caused him damage. This requirement accounts for the lack of successful third-party damage awards in many suits, particularly personal injury suits.

Gasch & Light, *Evolving Legal Remedies for Toxic Torts: An Overview*, LEGAL NOTES & VIEWPOINTS, Aug. 1984, at 1, 21.

courts must become discriminatingly receptive to epidemiological and other scientific data in resolving toxic tort claims.²⁷² Currently, however, the attitudes of the judiciary toward statistical evidence may lead to the defeat of toxic tort claims.²⁷³ Some courts have cast aspersions on this type of evidence by characterizing it as hearsay, thus making it inadmissible.²⁷⁴ The bias against statistical evidence arising out of epidemiological studies is multifaceted. First, because statistics can be manipulated, an aura of uncertainty surrounds the use of epidemiological evidence.²⁷⁵ Second, statistical evidence emanating from epidemiological studies is by its very nature a population group study and not an individual study. This evidence does not necessarily shed light upon the cause of an individual's injury.²⁷⁶ Third, given that epidemiological proof may establish a statistical causal relationship, courts must still determine whether, within a reasonable medical certainty, that is, more likely than not, a particular person developed his or her injury from the source in question.²⁷⁷ The key to reconciling law, medicine, and science regarding the causation question is to overcome barriers erected by these widespread judicial predilections.²⁷⁸

To accomplish this objective science and law must complement each other

272. *Id.* Enhanced judicial responsiveness to epidemiological and other scientific evidence, however, will not necessarily be an Elysium for exposure victims. In a series of cases stemming from Vietnam veterans' exposure to Agent Orange, a federal district court countenanced the value of epidemiological evidence, but repeatedly concluded that it did not reflect "that paternal veteran exposure to Agent Orange causes birth defects or miscarriages." *In re Agent Orange Prod. Liab. Litig.*, 603 F. Supp. 239, 246-47 (E.D.N.Y. 1985); *see also In re Agent Orange Prod. Liab. Litig.*, 611 F. Supp. 1223, 1231 (E.D.N.Y. 1985) (no data shows causal connection between exposure to Agent Orange and serious adverse health effects). In this case, instead of buttressing the position of the plaintiff, the district court appraised the epidemiological evidence as plainly indicating that "Agent Orange cannot now be shown to have caused plaintiffs' numerous illnesses." *Id.* at 1241. To exacerbate matters, the expert affidavits that the plaintiffs presented fell far short of counteracting the virtually unswerving epidemiological proof proffered by the government. For an in-depth evaluation of the weaknesses of the plaintiffs' expert and epidemiological cases *see id.* at 1235-36. The plaintiff's bane is inadequacy of proof of causation. *See In re Agent Orange Prod. Liab. Litig.*, 611 F. Supp. 1290, 1295 (E.D.N.Y. 1985); *In re Agent Orange Prod. Liab. Litig.*, 611 F. Supp. 1285, 1289-90 (E.D.N.Y. 1985); *In re Agent Orange Prod. Liab. Litig.*, 611 F. Supp. 1267, 1279 (E.D.N.Y. 1985); *In re Agent Orange Prod. Liab. Litig.*, 597 F. Supp. 740, 782 (E.D.N.Y. 1984).

273. Comment, *Epidemiologic Proof of Probability: Implementing the Proportional Recovery Approach in Toxic Exposure Torts*, 89 DICK. L. REV. 233, 242 (1984).

274. Comment, *A Private Nuisance Approach to Hazardous Waste Disposal Sites*, 7 OHIO N.U.L. REV. 86, 100 (1980). The argument generally raised against epidemiologic statistical proof, for example, is that the proof is simply based on probabilities and hence is inherently imprecise. McElveen & Eddy, *supra* note 23, at 66. Also, "problems of authenticity and cross-examination" are present in connection with epidemiological studies. *Id.* at 59.

275. McElveen & Eddy, *supra* note 23, at 59. "[S]tatistics may be probative. However, they can also be manipulated, thereby undermining the probative value and reliability of the conclusions drawn." *Id.*

276. *Id.* at 60. For a legal system wedded almost inextricably to the concept of specific causation "the question still remains: did the substance or agent in question cause the disease in the particular person in whom the legal system is interested?" *Id.* at 47.

277. *Id.*

278. "The basic issue is how science and law can effectively interact to provide a sound basis for a determination of causation . . ." Barnard, *Exposure to Toxic Wastes: Uncertainty, Science, and the Law* 7 (Oct. 19, 1983) (unpublished paper presented at National Legal Center for the Public Interest, Conference on Occupational Disease, Toxic Torts and Hazardous Wastes).

even though lawyers and scientists view the world from radically different perspectives.²⁷⁹ How do we achieve this sorely needed symbiotic relationship between lawyers and scientists? If we are able to achieve some sort of rapprochement, how do we mold it into a positive force to foster a greater sense of understanding about the true nature of the problem of establishing causation in toxic tort litigation? This litany of seemingly complex questions may have a simple answer: the two groups should simply begin to communicate effectively with each other.²⁸⁰ From these improved lines of communication a better understanding of the respective disciplines and an enhanced awareness of the differences and similarities in their analytical approaches will probably ensue. More importantly, this mutual understanding would act as a catalyst for the formation of a rational and effective system of regulation and safety management.²⁸¹ A palatable compensation process for toxic substance exposure-related diseases and injuries could also result from this essential cross-fertilization.

IV. A PROPOSED SOLUTION TO THE CAUSATION ISSUE IN TOXIC TORT LITIGATION

That causation presents imposing problems for the traditional common law tort system is axiomatic.²⁸² Some commentators advocate an overhaul of the conventional tort system to deal with this pressing concern,²⁸³ but serious thought should be given to abdicating for the most part the traditional common law tort litigation model and replacing it with an administrative compensation scheme.²⁸⁴ Such a change in direction may have an optimal effect in terms of fostering fairness and economic efficiency in the allocation of the scarce resources available for the compensation of toxic tort injuries.

279. Todhunter, *Science and Law in Chemical Regulation: Bridging the Chasm* 18 (May 15, 1984) (unpublished paper presented at Conference on Hazard Evaluation and Risk Assessment, Society of Toxicologic Pathologists). The commentator theorizes that the dramatic divergence of law and science results from the law being rather static because of adherence to the concept of stare decisis, while science is more susceptible to "change as we learn and understand more about the natural world." *Id.* at 1.

280. *Id.* at 18. A prime illustration of the chaos that can arise in connection with health and safety regulation when no proper melding of law and science occurs is the field of toxic and hazardous waste management, which, ironically, is the genesis for many toxic tort suits. Unfortunately, scientists do not communicate sufficiently with the environmental regulators, many of whom are lawyers; the result borders on disaster. See Manley, *Pragmatic Approach to Environmental Studies*, speech presented at the Environmental Conference, University of Cincinnati (Apr. 12, 1985).

281. Todhunter, *supra* note 279, at 18.

282. Note, *A Suggested Remedy For Toxic Injury: Class Actions, Epidemiology, and Economic Efficiency*, 26 WM. & MARY L. REV. 497, 514-16 (1985).

283. See Trauberman, *supra* note 19, at 177 (predetermination of problems, apportionment, class actions, Hazardous Substance Victims' Compensation Fund, elimination of proof for compensation); Note, *supra* note 282, at 509 (complete restructure of tort system for compensating hazardous waste injuries).

284. The administrative scheme alternative is not a completely novel idea. For example, Professor Grad's Superfund Section 301(e) report advocates, among many dramatic proposals, that hazardous waste exposure victims have available an administrative remedy option (Tier One). SUPERFUND § 301(e) STUDY GROUP, *supra* note 248.

A. *Why Not a Judicial Solution?*

Probably the best argument against adopting a judicial solution to the causation puzzle is the judicial litigation model itself. As noted earlier,²⁸⁵ common law tort rules regarding the establishment of liability, including causation, developed without the intricacies of toxic tort in mind. Because of this deficiency, it is virtually impossible to recover for toxic tort injuries.²⁸⁶ Although tinkering with the system may alleviate the problem to some extent,²⁸⁷ this seems to be an improvident course of action because it ignores the obvious fact that the crux of the problem will still be extant. The conventional tort law system has judges and juries who experience great difficulty in dealing with highly technical scientific and medical issues²⁸⁸ that invariably are integral components of toxic tort litigation. Furthermore, the tort system has high transaction costs, most notably for fees to expert witnesses and attorneys.²⁸⁹ The system also has an inherent propensity to be slow, cumbersome, and protracted, denying the parties to the litigation a prompt resolution of their dispute.²⁹⁰

To think that a meaningful solution to the causation problem in toxic tort litigation can somehow be carved from the conventional tort system, is wishful thinking at best.²⁹¹ The nuances of the causation element in toxic tort cases are just too taxing for the common law tort system, even with modification. Thus, a carefully crafted administrative compensation scheme is perforce necessary.²⁹²

285. See *supra* notes 143-50 and accompanying text.

286. See Note, *supra* note 282, at 509.

287. See *supra* notes 162-247 and accompanying text.

288. See *In re Agent Orange Prod. Liab. Litig.*, 611 F. Supp. 1223, 1231 (E.D.N.Y. 1985). The court, conceding the importance of epidemiological evidence on the causation issue, wrestled almost aimlessly with deciding whether epidemiological proof and animal studies established the causal linkage between the dioxin exposure of Vietnam veterans and the diseases they allegedly suffered. See also Todhunter, *supra* note 279, at 16 (ability of judges and jurors to understand this information questionable).

289. A complex question like causation-in-fact carries a tremendous price tag to meet the legal proof requirements. See Note, *supra* note 282, at 515-16.

290. SUPERFUND SECTION 301(e) STUDY GROUP, *supra* note 248. The recommendations of the § 301(e) committee, however, fall short of the desired goal because they propose an administrative system aimed at supplementing, rather than supplanting, a system of legal remedies.

291. Actually, an alternative compensation system may protect traditional tort principles. See Mashaw, *supra* note 10, at 1393 (problem of establishing causation in toxic torts can be solved by eliminating tort system).

292. See Bartlett, *The Legal Development of a Viable Remedy for Toxic Pollution Victims*, 4 TOXIC SUBSTANCES J. 277. The commentator makes this observation:

Development of an alternative compensation mechanism other than traditional tort law has received considerable legislative study and attention. These studies have been virtually unanimous in concluding that existing statutory and common law allows for an unsatisfactory remedy for victims exposed to this type of injury. This is especially true for the smaller type of claims. The frequent backlog of court cases also presents a serious impediment to a satisfactory compensation scheme.

Id. (footnotes omitted); see also Trauberman, *Toxic Substances and the Chemical Victim*, A.B.A. ENVTL. L. NEWSLETTER, Summer 1983, at 1, 2 (existing legal system not efficient or effective in handling such claims).

B. *The Proposed Administrative Model*

Although this administrative compensation scheme proposal hopes to engender further reflection regarding the troublesome element of causation, bear in mind that reform simply for the sake of enhancing an exposure victim's chances of recovery is not universally endorsed.²⁹³ Critics of compensation system reform suggest that such reform is not necessary.²⁹⁴ Such reasoning seems misguided in view of the widely espoused position that a noticeable problem with many of the current environmental laws is their preoccupation with prevention, rather than victim compensation.²⁹⁵ Moreover, a carefully crafted and well-conceived administrative scheme will not only provide a reasonable level of compensation for the exposure victim, but will do so in a shorter period of time, with lower transaction costs, and with a greater degree of scientific and medical accuracy.²⁹⁶ Of course, for acceptance, an administrative scheme must have beneficial consequences that extend not only to the injured claimant actually involved in the administrative process, but to the whole of society as well. The attribute of this administrative compensation scheme that is central to this goal will be its ability to galvanize toxic and hazardous waste polluters to engage in activities designed to reduce the risks associated with the generation, transportation, and disposal of toxic and hazardous wastes.²⁹⁷

1. *The Basic Goals of the Proposed Administrative Model*

Any proposed alternative to the traditional common law tort system that is touted as a more favorable means of handling the countervailing legal, political, and economic policy concerns in toxic tort litigation can only acquire some semblance of legitimacy by providing palatable accommodation of these competing interests.²⁹⁸ An alternative compensation scheme, whether administrative, judicial, or some combination thereof, must strike a

293. Trauberman, *supra* note 292, at 1.

294. *Id.*

295. Comment, *supra* note 111, at 730. "Legislatures have geared environmental statutes primarily to enforcement against the chemical industries and have thus provided regulatory mechanisms at both state and federal levels. These regulatory statutes provide extensive administrative remedies to the government, but no compensatory remedies to the injured party." *Id.* (footnotes omitted); see *Almond Hill School v. Department of Agriculture*, 768 F.2d 1030, 1035-37 (9th Cir. 1985) (no private right of action under FIFRA nor under 42 U.S.C. § 1983 (1982)).

296. The converse is also true; an ill-advised administrative compensation scheme could create a situation where the advantages become disadvantages. See Comment, *Toxic Torts and Chapter 11 Reorganization: The Problem of Future Claims*, 38 VAND. L. REV. 1369, 1394-95 n.208 (1985) (presents general outline of victim compensation system modeled after Superfund).

297. See Soble, *supra* note 192, at 730 (enumerating compensation for injured exposure victims and risk reduction for the benefit of society as bare minimum objectives of any legitimate alternative administrative compensation scheme).

298. See Ginsberg & Weiss, *supra* note 144, at 933-39 (outline of compensation scheme to accommodate countervailing legal, political, and economic interests); Prince, *Compensation For Victims of Hazardous Substance Exposure*, 11 WM. MITCHELL L. REV. 657, 722-31 (1985) (study does not recommend establishment of compensation fund, but provides provocative recommendations in case a fund is established in the future; these recommendations appear compatible with reconciling competing legal, political, and economic concerns); see also Kahn

proper balance between the legal goals of compensation, deterrence, and corrective justice; the political goals of expedience, negotiation, compromise, and settlement; and the economic goal of maintenance of viable enterprises, which are essential to economic growth despite their potentially adverse effect on the quality of the environment and on environmental exposure victims.

2. *The Administrative Framework for Achieving the Goals*

The proposed administrative system for disposing of toxic tort claims must embody features that promote each of the legal goals of compensation, deterrence, and corrective justice.²⁹⁹ Central to this objective is the recognition that an effective compensation scheme must be national in scope, funding, and direction. The rationale for the requirement of a national scheme is that the toxic tort conundrum is simply too imposing to be handled on any smaller scale.³⁰⁰ What configuration should a national administrative compensation scheme take? The system should, of course, provide the most meaningful form of compensation to toxic tort exposure victims, while simultaneously fostering deterrence of purveyors of toxic and hazardous wastes and bringing about risk reduction in a manner that produces at least a rough sense of justice and fairness between the polluters and the victims of pollution. The crucial inquiry for the purpose of this Article, however, is how one gives substance and flesh to this very skeletal, but essentially correct answer.

Of primary concern is developing a scheme that guards adequately against the unsavory situation of denying recovery to an unacceptably large number of deserving toxic tort claimants because of anachronistic tort principles developed without the complexities of toxic tort litigation in mind.³⁰¹ On the other hand, to have any meaningful deterrent, or risk reduction, effect, the

& Anderson, *A Ten-Point Proposal for an Asbestos Superfund*, 18 FORUM 395, 402-10 (1982) (covers contributions, administration, eligibility, and tax considerations).

299. See Trauberman, *supra* note 19, at 177. The commentator proposes a statutory victim compensation model that fosters the tort goals of fair compensation, meaningful deterrence, and corrective justice principally through relaxation of the legal, scientific and economic burdens that normally beset the exposure victim. *Id.*

300. See Ginsberg & Weiss, *supra* note 144, at 930. An effective solution to the problem of victim compensation in connection with toxic torts must emanate from the federal level "since individual states will be reluctant to create a climate hostile to industry by imposing costs not existing in friendlier jurisdictions." *Id.* Not only the mammoth nature of the risk, but also political and economic influences, can stifle constructive action by the states. Hence, the proposed administrative compensation scheme must be a product of federal legislation and have the imprimatur of the federal government.

301. Comment, *Close Encounters*, *supra* note 134, at 854; see Note, *supra* note 134, at 180-81; Note, *Increased Risk of Cancer as an Actionable Injury*, 18 GA. L. REV. 563, 564 (1984); see also Comment, *Agent Orange*, *supra* note 134, at 67-71 (profound proof problems in connection with causation for Vietnam veterans who allegedly suffered injury from exposure to Agent Orange). For a discussion of the causation problem in connection with Agent Orange in the litany of *Agent Orange* cases see *supra* note 272. Causation is not the only formidable barrier to recovery by an exposure victim. Traditional tort statutes of limitation provisions enhance the likelihood that victims of latent injuries will be barred from a legal remedy. Note, *Statutes of Limitations and Pollutant Injuries: The Need for a Contemporary Legal Response to Contemporary Technological Failure*, 9 HOFSTRA L. REV. 1525, 1527 (1981).

system must be grounded upon principles that impose liability only upon those who are the likely cause of the toxic harm underpinning the tort claim.³⁰² The indiscriminate imposition of liability upon potential polluters will have an insignificant deterrent effect because it will undermine any incentive on their part to engage in any kind of behavioral modification to reduce the risk; the polluters will sense the futility of trying to insulate themselves from broad, open-ended liability. Also, the imposition of virtually unlimited liability upon polluters could have an untoward effect upon the economic growth and prosperity of many vital enterprises in the United States.³⁰³

3. *Specifics of the Proposed Administrative Plan*

The administrative compensation scheme presented here has three principal objectives in mind: first, to compensate the exposure victim; second, to force the polluter to engage in behavioral modification ineluctably reducing the risks attendant to the disposal of toxic or hazardous wastes to a level that does not pose an imminent and substantial endangerment to human health or the environment; and third, to provide a causation formula that brings about these much needed legal and political goals at the lowest possible cost to the economic viability of enterprises that are vital to the nation's economic growth and prosperity. To accomplish these compelling, perhaps countervailing, objectives, the compensation scheme will be carefully designed in terms of the rules of liability, allowable damages, and methods of funding. The causation element of the proposed administrative compensation scheme is an important feature of the liability component.

a. *Rules of Liability (Causation).* At the heart of any rational suggestion for an administrative compensation scheme for toxic injuries is a legitimate framework for resolving the much discussed question of causation.³⁰⁴ Although causation-in-fact is basically a factual inquiry, policy impulses do affect its determination.³⁰⁵ As noted earlier, the foremost policy consideration for modifying traditional common law causation principles has been the

302. Huber, *The Bhopalization of U.S. Tort Law*, 2 ISSUES SCI. & TECH. 73, 76 (1985); see also Note, *Allocating the Costs of Hazardous Waste Disposal*, 94 HARV. L. REV. 584, 597-98 (1981) (criticizes lack of deterrence in existing Superfund taxing program).

303. Huber, *supra* note 302, at 78-79; see also Sales & Cole, *Punitive Damages: A Relic that Has Outlived Its Origins*, 37 VAND. L. REV. 1117, 1155 n.171 (1984) (Manville Corp., Unarco, and Amatec forced into chapter 11 bankruptcy by huge damage awards and litigation expenses arising from asbestos cases).

304. A suitable causation component is a sine qua non of an administrative compensation system to strike a proper balance among the policy goals of compensation, deterrence, and corrective justice. The very integrity of a compensation system is at risk without a rational causation element. See Huber, *supra* note 302, at 81. Congruent with Superfund and notions of progressiveness, however, the basis of liability under this compensation system will be strict and, thus, will not hinge upon assignment of blame or fault. See *supra* notes 13 & 93.

305. See Malone, *supra* note 14, at 61. "[P]olicy may often be a factor when the issue of cause-in-fact is presented sharply for decision, much as it is when questions of proximate cause are before the court." *Id.* See generally *Sindell v. Abbott Laboratories*, 26 Cal. 3d 588, 607 P.2d 924, 163 Cal. Rptr. 132, cert. denied, 449 U.S. 912 (1980) (market share liability); *Summers v. Tice*, 33 Cal. 2d 80, 199 P.2d 1 (1948); *Abel v. Eli Lilly & Co.*, 94 Mich. App. 59, 289

desire to ensure that an innocent, unsuspecting victim is not foreclosed from recovery by intractable, outdated common law evidentiary barriers.³⁰⁶ As a result of this judicial zeal to provide victim compensation, a system of alternative causation has evolved by which the courts have apparently subordinated the countervailing policy consideration that one should only suffer liability for those consequences that he or she has actually caused.³⁰⁷

The relevant issue is whether any of these ameliorative causation devices should be injected into an administrative determination of a toxic tort claim. The answer should be a resounding "yes," provided the devices will substantially bridge the gap between legal causation and scientific causation and thus present a model truly apposite to intricate toxic tort causation problems.³⁰⁸ The proposed administrative compensation scheme will attempt to meld legal and scientific principles on the causation issue; more importantly, it will offer an adjudicative mechanism that will promote intelligent resolution of these issues. This will provide a partial break from the common law litigation model where scientifically uninformed judges and jurors attempt to decide esoteric causation issues in what may be described as a game of chance that actually undermines the rights of the parties to a fair and impartial adjudication of the issues.³⁰⁹

To avoid unenlightened, opaque decision-making in the field of toxic torts, a capable arbiter is necessary to deal effectively with every complicated question; this principle is especially true of the causation issue.³¹⁰ To this end, a

N.W.2d 20, 26 (1980) (concert of action); *Ferrigno v. Eli Lilly & Co.*, 175 N.J. Super. 551, 420 A.2d 1305, 1314 (Super. Ct. Law Div. 1980) (alternative liability).

306. See *supra* notes 151-61 and accompanying text.

307. See, e.g., *Hardy v. Johns-Manville Sales Corp.*, 509 F. Supp. 1353, 1357 (E.D. Tex. 1981) (market share liability applicable to asbestos cases), *rev'd on other grounds*, 681 F.2d 334 (5th Cir. 1982); *Hall v. E.I. Du Pont de Nemours & Co.*, 345 F. Supp. 353, 374 (E.D.N.Y. 1972) (enterprise theory); *Bichler v. Eli Lilly & Co.*, 79 A.D.2d 317, 436 N.Y.S.2d 625 (1981), *aff'd*, 55 N.Y.2d 571, 436 N.E.2d 182, 450 N.Y.S.2d 776 (1982) (concert of action theory/DES); *Martin v. Abbott Laboratories*, 102 Wash. 2d 581, 689 P.2d 368, 382 (1984) (modified market share/DES); *Collins v. Eli Lilly Co.*, 116 Wis. 2d 166, 342 N.W.2d 37, 49 (1984) (risk contribution theory/DES); see also Note, *Pollution Share Liability: A New Remedy for Plaintiffs Injured by Air Pollutants*, 9 COLUM. J. ENVTL. L. 297 (1984). Pollution share liability is similar to market share liability. Pollution share liability shifts the burden of proof of causation to the defendants. Each defendant who fails to prove that he could not have contributed to the plaintiff's harm must bear a proportional share of the judgment based on his share of the pollution. The plaintiff, however, must establish that each defendant was polluting the air at the time of his or her injury.

308. Note, *supra* note 282, at 520-21.

309. Note, *Scientific Evidence and the Question of Judicial Capacity*, 25 WM. & MARY L. REV. 675, 684 (1984). Juries may not be competent to handle disputes involving complex issues of scientific fact. *Id.* Moreover, although judges are in a better position to resolve complex disputes because they are generally better educated than the typical lay juror, "[a] trial judge's educational advantage does not indicate . . . that the judge necessarily possesses the technical skills necessary to fully comprehend complex scientific evidence." *Id.* at 685; see also *Ethyl Corp. v. EPA*, 541 F.2d 1, 67 (D.C. Cir.) (concern about the incompetence of lay judges in complex litigation), *cert. denied*, 426 U.S. 941 (1976); *Jasanoff & Nelkin, Science, Technology and the Limits of Judicial Competence*, 68 A.B.A. J. 1094 (1982) (incompetence of the courts in dealing with scientific and technological problems).

310. See *Pierce, Institutional Aspects of Tort Reform*, 73 CALIF. L. REV. 917 (1985). The commentator postulates that tort reform in general is needed and that reform is especially needed in toxic tort cases because of the difficulty of establishing causation. Specifically, ad-

panel of experts in the fields of law, science, and medicine should be commissioned to resolve, among other things, the question of whether there is sufficient evidence of the requisite causal relationship between exposure of the claimant to a toxic or hazardous substance and the ensuing injury for which the claimant seeks recovery.³¹¹ This panel will be designated as the National Board for the Investigation and Compensation of Toxic Exposure Injuries (the Board). It will consist of six members, two lawyers, two scientists, a medical doctor, and an economist.³¹² The rationale for placing an econo-

ministrative agencies are best equipped to determine causation, especially in cases of toxic torts, because of their superior ability to assess liability on the basis of statistical probabilities, to appraise costs on the basis of market share, and to award damages when the causation probability is less than 50%, all of which courts are unlikely to do. *Id.* at 932; see also Huber, *supra* note 302, at 79 (courts should defer to experts in regulatory agencies). Courts may use expert special masters in complex environmental litigation. See Little, *Court-Appointed Special Masters in Complex Environmental Litigation: City of Quincy v. Metropolitan District Commission*, 8 HARV. ENVTL. L. REV. 435-469 (1984); see also Whitney, *The Case for Creating a Special Environmental Court System*, 14 WM. & MARY L. REV. 473, 485-86 (1973) (acknowledges need for special competence and expertise on part of decisionmakers in environmental tort cases and suggests system of environmental courts). But see Leventhal, *Environmental Decisionmaking and the Role of the Courts*, 122 U. PA. L. REV. 509, 549-54 (1974) (role of scientific experts should be limited to advisors to courts).

An administrative compensation scheme, however, would use special expertise more efficiently than would courts, although admittedly the use of experts can ease some of the cumbersome nature that is characteristic of the judiciary's existing treatment of environmental litigation. But see Bazelon, *Coping With Technology Through the Legal Process*, 62 CORNELL L. REV. 817, 828 (1977) (cautions that scientific advisors may supplant judges). In Judge Bazelon's view the use of scientific advisors

runs the risk of creating surrogate judges, who would be making all the real decisions, while . . . judges are simply left to wear the black robes. In highly controversial areas, where the experts disagree, it would be dangerous indeed to allow one expert with one point of view to have special access to the judge's ear.

Id. This apprehension may have prompted some courts to refrain from hearing cases that involve complex and technical issues beyond their competency. See *Washington v. General Motors Corp.*, 406 U.S. 109, 113 (1972); *Ohio v. Wyandotte Chems. Corp.*, 401 U.S. 493, 503-04 (1971). Although the concern that expert advisors will somehow preempt judges may have some merit, in the proposed administrative compensation scheme each member of the expert panel that will make the critical decisions will possess specialized knowledge, and the likelihood of an uninformed arbiter being neutralized by some highly skilled expert is perhaps nil.

311. See the proposed Product Liability Voluntary Claims and Uniform Standards Act 25 (Staff Working Draft #1, July 15, 1985) [hereinafter cited as Staff Working Draft #1] (establishes Health Effects Panel).

This bill was ultimately reported out of the Senate Committee on Commerce, Science, and Transportation on August 15, 1986, as The Product Liability Reform Act (S. 2760). Senate Leader Robert Dole withdrew S. 2760 from further consideration, explaining that the measure could not pass that year with so little time left in the session. See *Senate Kills Products Liability*, THE WEEK IN CONGRESS, CONG. INDEX (CCH) 2 (Sept. 26, 1986).

312. The proposed composition of the Board mirrors the integral perspectives in a toxic tort determination. Thus, the confluence of well-informed individuals in the areas of law, science, medicine, and economics will markedly enhance the likelihood of reaching a sound policy decision. Staff Working Draft #1, *supra* note 311, at 34, on the other hand, charges a Health Effects Panel with determining causation. Nine members, each of whom is well-qualified and specifically trained in medicine or science, will compose the Health Effects Panel. The proposed act also designates the method of selection, staffing, compensation, and administrative support of the panel. In the administrative compensation scheme proposed here, the Secretary of Commerce will appoint the members of the Board pursuant to a federal statutory mandate that they be exceptionally well-qualified to assess the scientific, medical, legal, and economic issues attendant to the causation question in toxic or hazardous exposure cases. Consistent with the indispensable requirement that members of the Board be fair and impar-

mist, a nonscientist, on the Board is to ensure that the economic ramifications of a cause-in-fact determination are always available to the Board. This arrangement is consistent with the notion that economic considerations are generally at the heart of environmental decision-making.³¹³ To be sure, profound political and economic factors underlie the toxic tort causation conundrum.³¹⁴

Despite the presence of an economist, legal, medical, and scientific perspectives will primarily guide the Board. Consequently, the test for causation that currently predominates the law, that causation must be established on a more probable than not basis, will be tempered by scientific and medical notions that just as easily can state causation in terms of scientific probability.³¹⁵ Rarely, if ever, can a scientist or medical doctor be absolutely certain; thus, the Board should realize that, in the area of toxic tort litigation, the causation question is such that a mere scientific probability, not a greater probability, should be the touchstone for recovery.³¹⁶ The

tial, no person will be eligible for selection who is affiliated in any way with a generator, transporter, or disposer of toxic waste. Moreover, this same disqualification will apply to anyone associated in any capacity with a supplier of toxic products. For the sake of symmetry, any individual related in any manner to an alleged victim of exposure to toxic wastes or products would also be barred from selection. Although political considerations may ineluctably play a role in Board member selection, these considerations should not necessarily taint the selection process. Thus, extremely able people, regardless of political persuasion, should be able to carry out their duties in a noble fashion.

To ensure the orderly administration of the Board the Secretary of Commerce should appoint an administrator, with impeccable administrative abilities, to handle ministerial duties such as the filing, docketing, and monitoring of administrative claims and perhaps to head up the investigation arm of the Board. See Soble, *supra* note 192, at 753 (commentator delineates a rough counterpart labelled an "Ombudsman").

313. See Calvert Cliffs' Coordinating Comm. Inc. v. United States Atomic Energy Comm'n, 449 F.2d 1109, 1118 (D.C. Cir. 1971); Environmental Defense Fund, Inc. v. Corps of Eng'rs, 325 F. Supp. 749, 757 (E.D. Ark. 1971); National Environmental Policy Act § 102, 42 U.S.C. § 4332 (1982). See generally Haight, Harrison & Nichols, *Benefit-Cost Analysis of Environmental Regulation: Case Studies of Hazardous Air Pollutants*, 8 HARV. ENVTL. L. REV. 395 (1984); Leape, *Quantitative Risk Assessment in Regulation of Environmental Carcinogens*, 4 HARV. ENVTL. L. REV. 86 (1980); Rodgers, *Benefits, Costs and Risks: Oversight of Health and Environmental Decisionmaking*, 4 HARV. ENVTL. L. REV. 191 (1980) (review of four legislative models of cost-benefit analysis available to governmental regulatory agencies).

314. See Soble, *supra* note 192, at 685.

315. See Note, *supra* note 282, at 516-21. Scientists calculate the likelihood of injury from exposure to a toxic substance by measuring the severity of exposure, which is measured by the proximity of the waste or by the degree of direct contact with the waste. These scientific findings are expressed in terms of probability. Moreover, scientists infer causation from statistical correlations between proximity to hazardous waste and higher rates of disease, illness, or birth defects. *Id.*; see also Note, *Judicial Attitudes Towards Legal and Scientific Proof of Cancer Causation*, 3 COLUM. J. ENVTL. L. 344 (1977) (exhorts courts to be more sensitive to probability in assessing legal liability for causation of cancer).

316. Comment, *supra* note 273, at 249. The commentator states:

Courts should require less than the traditional quantum of proof from the plaintiff in toxic tort cases. Provided the plaintiff proves the unavailability of other medical evidence, the court should permit the case to go to trial with statistical evidence limited to the issue of causation and the issue of causation limited to the probability alleged in the complaint. Upon sufficient evidence, the plaintiff should be awarded a recovery proportional to the probability of causation he has shown.

Id.; see also Rosenberg, *supra* note 6, at 866 (advances proportionality theory that allows recovery regardless of probability of causation or absence of individualized proof of causation).

Board's ready acceptance of epidemiological proof, toxicological studies, animal studies, and other scientifically sanctioned evidence to illumine the causal nexus issue thus is necessary. By no means should the Board's acceptance of scientific data emasculate the requirement of adequate proof of causation. Adequate proof of causation remains the cornerstone of this administrative compensation proposal,³¹⁷ but if the evidence, including scientific evidence, reaches the level of reasonable probability, the requisite causal relationship for awarding compensation should exist. Although this probability standard eases the claimant's burden on the causation question, it does not completely relieve him or her of all responsibility.³¹⁸ Moreover, the claimant will present his or her case under the watchful eye of an expert Board, the majority of whom will understand the complex issues underlying the causation determination. As a consequence, the claimant's burden may actually be greater than under traditional common law principles because of the detached, objective manner in which the Board will likely approach the issue. This scenario is a far cry that the heartrending reaction that purportedly underlies the decisions of lay jurors in many complex tort cases.³¹⁹ Moreover, having individuals on the Board who have the requisite legal, medical, and scientific backgrounds to resolve the causation issues accurately and expeditiously will tend to be economically efficient.

To ensure a reasonable degree of fairness, however, the six-member Board's decision should be subject to appellate review. A three-member Toxic Exposure Compensation Commission should conduct the review, which will be limited in scope.³²⁰ A truncated appellate process ensures the speedy disposition of the matter and reduces the transaction costs associated with the prosecution and defense of toxic tort claims.³²¹

317. Aligning the causation element with scientific standards, while accepting scientific evidence to give the causation element substantive content, makes this proof apposite to the toxic tort causation issue.

318. The claimant must still meet a threshold level of proof, a reasonable probability, to prevail. Although the level of proof necessary, 50% or less, will vary with the facts, this is by no means an empty requirement.

319. In tort litigation, lay jurors' verdicts are often very sympathetic toward the injured plaintiff. Because "damages are not determined by a concrete legislative schedule as under workers' compensation, but are left to the jury to measure on a case-by-case basis under a general formula which gives the jury wide discretion and considerable opportunity to apply its own independent judgment" changing this phenomenon is unlikely. R. EPSTEIN, C. GREGORY & H. KALVEN, JR., *supra* note 201, at 742; *see also* Abraham & Merrill, *supra* note 249, at 104 (jurors may ignore legal instructions and make a decision based on sympathy).

320. A limited appellate process assures that claims will be resolved with alacrity. Thus, the Toxic Exposure Compensation Commission should hear appeals only if a federal, procedural due process, constitutional right is at risk. *See* Prince, *supra* note 298, at 728. The Toxic Exposure Compensation Commission should be made up of three administrative law judges because the Commission's appellate jurisdiction is circumscribed to this narrow question of constitutional law.

321. Huber, *supra* note 302, at 77. The commentator notes:

Furthermore, the new tort system does not serve as an effective tool for compensating victims of public risks. Rather, it is highly capricious, its proceedings are interminably protracted, and, worst of all, its agents are extremely expensive. For every dollar that—after many years—ends up in the pocket of an injured plaintiff, several dollars will be diverted to lawyers for the plaintiff and

b. *Allowable Damages.* Compelling policy questions surround the issue of what damages a successful claimant in a toxic tort case should receive. Should an administrative compensation scheme allow damage awards that mirror traditional tort remedies or should the permissible compensation package be streamlined and thus provide compensatory relief that falls short of a full tort recovery? Policy considerations argue in favor of a combination of both possibilities.

For example, the full array of traditional tort damages furthers the ever present tort law goal of providing adequate compensation to the innocent victim. Within this catalog of damages the most debatable components are damages for pain and suffering and for loss of future earning capacity.³²² Depending on the facts of the case, these components can and often do make up a substantial part of a personal injury award. Yet, both awards require a certain amount of "crystal balling" by the jury since they are inherently speculative and conjectural. The positive advantage of providing an innocent party full recompense for his or her injuries, however, generally overshadows the potentially negative features of pain and suffering and lost earning capacity awards. On the other hand, an administrative compensation scheme perhaps should eschew damages for pain and suffering and loss of future earning capacity because they have historically been used to allow the injured party to pay attorneys' fees and still have adequate compensation left.³²³ Moreover, the impetus for such awards, especially for pain and suffering damages, is frequently the emotional states of mind of jurors. Thus, a legitimate administrative compensation scheme, the argument goes, should limit recovery to those damages that can be established with a fair degree of specificity, that are not too speculative or conjectural, and that are not susceptible to being a product, in whole or in part, of the passion of a jury.³²⁴

defendant and to judges, law clerks, administrative staff, expert witnesses, and miscellaneous other camp followers.

Id.; see also Kahn & Anderson, *supra* note 298, at 395-401 (lamenting high transaction costs attendant to asbestos litigation); *Rand Urges Tort Commission*, NAT'L L.J., Dec. 16, 1985, at 13 (addresses litany of special problems created by mass tort litigation, including high transaction costs).

322. Although courts have universally permitted tort damages for pain and suffering, some have advanced scathing assaults upon this practice on the basis that these are noneconomic losses not precisely measurable in dollars and cents. See Jaffe, *Damages for Personal Injury: The Impact of Insurance*, 18 LAW & CONTEMP. PROBS. 219, 224-25 (1953); Peck, *Compensation for Pain: A Reappraisal in Light of New Medical Evidence*, 72 MICH. L. REV. 1355, 1370-71 (1974). Such disdainful arguments have fueled similar restrictive thoughts that pain and suffering damages should not be awarded from a toxic tort administrative compensation fund. Prince, *supra* note 298, at 730. Similar policy arguments also militate against awarding damages for loss of future earning capacity, although such a loss is an economic loss. R. EPSTEIN, C. GREGORY & H. KALVEN, JR., *supra* note 201, at 742; see also J. HENDERSON & R. PEARSON, *THE TORTS PROCESS* 198 (2d ed. 1981) (task of placing dollar values on loss of earning capacity involves guesswork).

323. J. HENDERSON & R. PEARSON, *supra* note 322, at 196; W. PROSSER, J. WADE & V. SCHWARTZ, *supra* note 239, at 552. The problems attendant to making an exact determination of these categories of damage also militate against their inclusion in this proposed compensation scheme.

324. In both workers' compensation and Price-Anderson Act, 42 U.S.C. §§ 2012, 2014, 2039, 2073, 2210, 2232, 2239 (1982) administrative compensation systems, for example, generally established fixed limits on liability exist. See Huber, *supra* note 302, at 78, 81. Moreover,

When the issue of punitive damages is injected into the equation, the policy questions intensify. Punitive damages serve two primary policy objectives: to punish the culpable party and to deter others from engaging in similar conduct.³²⁵ Some statutory and administrative compensation schemes expressly preclude punitive damages.³²⁶ Other schemes do not specifically address the issue, so courts have addressed the question.³²⁷ Punitive damage awards that actually punish wrongdoers who act with conscious indifference for the safety of others and that deter others from engaging in similar conduct appear to further important policy objectives. Arguments against the imposition of such a sanction, however, do exist. The arguments include: (1) punishment as a basis for action should be restricted to criminal proceedings and not allowed in civil tort proceedings, and certainly not in civil administrative proceedings;³²⁸ and (2) punitive damages are simply a

arguments for exclusions of or fixed limits on certain components of damage in toxic tort cases are given impetus by decisions like *Jackson v. Johns-Manville Sales Corp.*, 781 F.2d 394, 399-406 (5th Cir. 1986) (asbestos exposure case allowing punitive damages, damages for reasonable probability of getting cancer, and damages for present fear of getting cancer in the future).

325. See *Sebastian v. Wood*, 246 Iowa 94, 66 N.W.2d 841, 844 (1954) (punitive damages awarded as punishment and as warning to others). Other cases also adopted the dual purposes of punishment and deterrence for awarding punitive damages. See *Grimshaw v. Ford Motor Co.*, 119 Cal. 3d 757, 810, 174 Cal. Rptr. 348, 382 (1981); *Hartford Accident & Indem. Co. v. U.S. Concrete Pipe Co.*, 369 So. 2d 451, 452 (Fla. Dist. Ct. App. 1979); *Kelsay v. Motorola, Inc.*, 74 Ill. 2d 172, 384 N.E.2d 353, 360 (1978).

326. The Federal Tort Claims Act, 28 U.S.C. § 2674 (1982) (United States not liable for punitive damages); GA. CODE ANN. § 17-14-2 (1982) (provides restitution for crime victims, but precludes awards for punitive damages, pain and suffering, mental anguish, and loss of consortium); see also Note, *Defining Punitive Damages Under the Federal Tort Claims Act*, 53 U. CIN. L. REV. 251 (1984) (problems in defining punitive damages in connection with explicit limitation in FTCA).

327. See, e.g., *Baas v. Hoye*, 766 F.2d 1190, 1195 (8th Cir. 1985) (reversed punitive damage award in suit under Consumer Product Safety Act, 15 U.S.C. § 2072 (1982), which does not provide for punitive damages award); *Hurst v. United States Postal Serv.*, 491 F. Supp. 870, 873 (W.D. Mo. 1980) (Administrative Procedure Act, 5 U.S.C. §§ 551-559 (1982), does not allow court to award punitive damages); *Woods v. Midwest Conveyor Co.*, 231 Kan. 763, 648 P.2d 234, 241 (1982) (administrative agency has no power to and may not determine damages). In *Woods* the Kansas Supreme Court overturned the Kansas Commission on Civil Rights' award of damages for pain, suffering, and humiliation because the discrimination act did not authorize damages for pain, suffering, and humiliation, or punitive damages. *Id.* For a discussion of the propriety of punitive damages pursuant to an arbitral decision see *Baker v. Sadick*, 162 Cal. App. 3d 618, 626, 208 Cal. Rptr. 676, 681 (1984) (arbitration panel could award punitive damages in medical malpractice claims); *Garrity v. Lyle Stuart, Inc.*, 40 N.Y.2d 354, 356, 353 N.E.2d 793, 794, 386 N.Y.S.2d 831, 832 (1976) (not permissible even if parties agree to punitive damages); *Rodgers Builders, Inc. v. McQueen*, 76 N.C. App. 16, 331 S.E.2d 726, 734 (1985) (arbitration of claims for punitive damages does not contravene public policy); see also *Alewine v. City Council*, 505 F. Supp. 880, 892 (S.D. Ga. 1981) (under Georgia law punitive damages only recoverable if authorized by statute), *rev'd on other grounds*, 699 F.2d 1060 (11th Cir. 1983), *cert. denied*, 105 S. Ct. 1391, 84 L. Ed. 2d 781 (1985).

328. See, e.g., W. PROSSER, J. WADE & V. SCHWARTZ, *supra* note 239, at 560. The authors note:

The policy of awarding punitive damages in tort cases has been a subject of much dispute. It has been condemned as undue compensation to the plaintiff beyond his just desserts, in the form of a criminal fine which should be paid to the state, if to anyone, and which is fixed by the caprice of the jury, without any standards, and without any of the usual safeguards thrown about criminal procedure, such as proof of guilt beyond a reasonable doubt, the privilege against self-incrimination, and even the rule against double jeopardy—since, except in

means to ensure the recovery of attorneys' fees under the American rule while still affording the claimant a full measure of recovery.³²⁹ Even if either one or both of the foregoing arguments are unfounded, the fact remains that courts impose punitive or exemplary damages on the basis of evidence that does not approach the beyond a reasonable doubt standard of the criminal law.³³⁰ Furthermore, in an administrative compensation system the additional complicating factor of who pays the punitive damage award from the available source of funds presents other knotty problems.³³¹ Thus, punitive damages will not be available under the proposed scheme.

For the proposed administrative compensation scheme to fulfill its policy objectives of compensation, deterrence, and corrective justice, the remedial provisions must be meticulously tailored with these goals in mind. Thus, the proposed administrative scheme will permit unlimited recovery with respect to medical expenses, both past and future, and lost wages, both past and future. The theory underlying this liberal treatment of these two cardinal elements of damages is simple: these damages lend themselves to a greater certainty of proof, and the vast majority of toxic tort victims are likely to suffer these losses.³³²

On the other hand, an unrestrained remedy for damages for past and fu-

Indiana, the defendant may still be punished for the crime after he has been mulcted in the tort action.

Id.; see Dorsey, *Fairness and Efficiency in the Law of Punitive Damages*, 56 S. CAL. L. REV. 1, 8 (1982); Sales, *The Emergency of Punitive Damages in Product Liability Actions: A Further Assault on the Citadel*, 14 ST. MARY'S L.J. 351 (1984). At least two states have codified more definitive guidelines for awarding punitive damages: MINN. STAT. ANN. § 549.20 (West 1986); MONT. CODE ANN. § 27-1-221 (1985).

For a general assessment of the provision of punitive damages from an economic perspective see Cooter, *Economic Analysis of Punitive Damages*, 56 S. CAL. L. REV. 79 (1982). The author uses economic analysis to determine when an award of punitive damages is appropriate and economic theory to compute the size of any punitive damage award.

329. W. PROSSER, J. WADE & V. SCHWARTZ, *supra* note 239, at 561. Several judicial decisions have expressly acknowledged that attorneys' fees may be a part of punitive damage awards. See *Nader v. Allegheny Airlines, Inc.*, 445 F. Supp. 168, 178-79 (D.D.C.), *rev'd*, 626 F.2d 1031 (D.C. Cir. 1978); *Anvil Inv. Ltd. Partnership v. Thornhill Condominiums Ltd.*, 85 Ill. App. 3d 1108, 407 N.E.2d 645, 654 (1980); *Planet Plows, Inc. v. Evans*, 600 S.W.2d 874, 877 (Tex. Civ. App.—Amarillo 1980, no writ).

330. W. PROSSER, J. WADE & V. SCHWARTZ, *supra* note 239, at 560.

331. A principal concern is the untoward economic ramifications that the provision of punitive damages would have on the compensation fund. Certainly, this added financial burden could jeopardize the reasonableness and fairness of the compensation system's funding apparatus. The potentially catastrophic effect of punitive damages awards has attracted the attention of some courts in the traditional private tort system. See *In re Air Crash Disaster*, 644 F.2d 594, 632 (7th Cir.), *cert. denied*, 454 U.S. 878 (1981) (punitive damages not allowed so as to protect defendant from excessive financial liability); see also Note, *After the Hyatt Tragedy: Rethinking Punitive Damages in Mass Disaster Litigation*, 23 WASHBURN L.J. 64, 69 (1983) (plaintiffs face risk that first to sue might receive all limited funds available). These policy arguments have special relevance to toxic tort litigation. Parnell, *Manufacturers of Toxic Substances: Tort Liability and Punitive Damages*, 17 FORUM 947, 966 (1982).

332. Medical expenses "tend to be made up of the most concretely and objectively demonstrable items advanced by the plaintiff." J. HENDERSON & R. PEARSON, *supra* note 322, at 189. Lost wages calculations may be somewhat more difficult, especially in connection with future wages, which have to be discounted to present value and which possibly raise questions as to the propriety of an inflation buffer. R. EPSTEIN, C. GREGORY & H. KALVEN, JR., *supra* note 201, at 754-55.

ture pain and suffering and mental anguish, loss of future earning capacity from personal injury or wrongful death, and permanent injuries, all of which are within the realm of the somewhat uncertain and speculative, seems ill-advised.³³³ Thus, as to these components of damages, a restrictive schedule or cap should limit a claimant's recovery. What should these constraints on recovery be? Should the Board dole out compensation to claimants in gradations up to some maximum ceiling?

The Board should not make these intricate determinations out of whole cloth. Rather, a legislatively mandated schedule of maximum benefits should control these types of damages.³³⁴ The Board should have discretion to determine damages falling below the maximum allowable amount, and should base these awards on the nature and degree of the claimant's injury, the claimant's occupational and educational background, and, in the case of wrongful death, the life expectancy of the deceased or surviving spouse or next of kin, whichever is less.³³⁵ In assessing these damages the Board will act essentially like a jury except that it will have maximum limits beyond which it cannot tread.³³⁶ This system will serve the interests of the claimant

333. Such damages, if doled out without any limitations, could place undue pressure upon the financial integrity of the compensation fund. Of course, the elimination of the lay jury from the process reduces the likelihood of outlandish, deep-pocket claims against the fund. See Huber, *supra* note 302, at 81. Similarly, no recovery will be allowed for some of the novel damage claims currently made in toxic tort litigation: deprivation and denigration of the quality of life, lifetime medical surveillance, increased risk of future disease, and fear of future injury. Such damages are too speculative and would probably jeopardize the fiscal integrity of the compensation fund. For a discussion of these innovative damages see *Ayers v. Township of Jackson*, 189 N.J. Super. 561, 461 A.2d 184, 186-90 (Super. Ct. Law Div. 1983), *aff'd in part, rev'd in part*, 202 N.J. Super. 106, 493 A.2d 1314 (Super. Ct. App. Div.), *cert. granted*, 102 N.J. 306, 508 A.2d 191 (1985).

334. The federal legislation creating the proposed administrative compensation scheme should embody the schedule of maximum benefits. A prime example of a legislatively imposed limitation to wrongful death recovery is the Warsaw Convention, which sets a \$75,000 cap on damages in civil international air mishaps. In *Eastern Air Lines, Inc. v. Mahfoud*, 106 S. Ct. 586, 88 L. Ed. 2d 522 (1985) (*per curiam*), an equally divided Court affirmed a decision of the Fifth Circuit Court of Appeals that trial courts may award both prejudgment and postjudgment interest in addition to \$75,000 limit. Although rapidly dwindling and decidedly in the minority, a few states continue to impose restrictions on recovery of certain damages under their respective wrongful death statutes. See R. EPSTEIN, C. GREGORY & H. KALVEN, JR., *supra* note 201, at 794; see, e.g., COLO. REV. STAT. § 13-21-203 (1973) (\$45,000 limit); N.H. REV. STAT. ANN. § 556.13 (1974) (\$50,000 limit); N.J. REV. STAT. § 2A:31-5 (1968) (damages awarded with reference to pecuniary injuries plus hospital, medical, and funeral expenses). The medical malpractice area has recently seen legislatively established restraints on liability. See, e.g., *Fein v. Permanente Medical Group*, 38 Cal. 3d 137, 145-46, 695 P.2d 665, 679, 211 Cal. Rptr. 368, 374 (1985) (\$250,000 cap on noneconomic damages in medical malpractice cases constitutional), *appeal dismissed*, 106 S. Ct. 214, 88 L. Ed. 2d 215 (1985); CAL. CIV. CODE § 3333.2 (West Supp. 1979) (\$500,000 cap on general damages); S.D. CODIFIED LAWS ANN. § 21-3-11 (1979) (\$500,000 cap on general damages); VA. CODE ANN. § 8.01-581.14 (1983) (\$1 million cap upon any recovery). In connection with no-fault automobile insurance, Florida, for example, restricts the instances when one can recover for pain and suffering. FLA. STAT. ANN. § 627.737 (West 1982).

335. See O. HARRIS, ARKANSAS WRONGFUL DEATH ACTIONS § 10-3 (1984) (citing *Helena Gas Co. v. Rogers*, 104 Ark. 59, 147 S.W. 473, 476 (1912); *Fordyce v. McCants*, 51 Ark. 509, 11 S.W. 694, 695-96 (1889)).

336. Necessity requires the imposition of maximum limits to recovery to maintain a reasonable level of benefits for injured claimants at affordable costs. Although the proposed administrative compensation scheme obviates the specter of heartrending jury awards,

by granting him the advantages of a deliberative process involving some measure of discretion; the system will also mollify the defendant polluters by shielding them from unreasonably large monetary awards based on nebulous and extremely speculative elements of damage.

In summary, the proposed compensation system will provide a reasonable level of compensation to the toxic tort exposure victim, limiting the recovery of only those damages that are inherently speculative and that defy exact measurement, while still providing a schedule of benefits that ensures more than just a token award for past and future pain and suffering, mental anguish, loss of future earning capacity, and permanent injury caused by the toxic exposure. Moreover, those damages that are readily reducible to a definite amount, lost wages and medical expenses, are not limited in any fashion. This mixture of limited and unlimited damage provisions will not only provide adequate compensation to the exposure victim, but will also bring about a favorable level of deterrence because of the specter of a sizable, though not unlimited, administrative recovery. Furthermore, the provisions designed to keep liability within reasonable bounds will foster justice and fairness for polluters by shielding them from possible catastrophic liability.

c. *Method of Funding.* To be a practicable alternative to the traditional tort liability system an administrative compensation scheme for toxic torts must receive funding in a manner that fosters solvency, encourages future research and development,³³⁷ and exacts contributions from polluters in an amount proportionate to the risk they create. To ensure solvency, eligibility criteria for funding the compensation program should embrace an extensive number of generators, transporters, and disposers of toxic substances and hazardous wastes.³³⁸ With this broad-based support of the compensation

prophylactic measures aimed at fostering fiscal prudence in administering compensation funds remain vital.

337. In connection with the preeminence of future research and development in toxic tort policy-making see Abraham & Merrill, *supra* note 249, at 102. The commentators suggest that the ultimate allocation of the burden of proof can play a significant role in future research into ascertainable, but unknown, risks. "[T]he likelihood that uncertainty will be resolved may be powerfully influenced by the allocation of the burden of proof in tort claims. The party who loses when uncertainty cannot be resolved has the incentive to discover the information necessary to resolve uncertainty, whether concerning source or biological causation." *Id.*; see Soble, *supra* note 192, at 687.

338. At a bare minimum, all generators, transporters, and disposal facilities, which are subject to the strictures of RCRA, should have some contribution obligation. Beyond this, the funding sources should comprise chemical and chemical feedstock producers as well as segments of the general manufacturing industry. In the Senate's most recent proposed Superfund bill, for example, the taxing authority extends to the manufacturing industry. *Superfund: Congress has dawdled too long over a hazardous-wastes bill*, Cincinnati Enquirer, Nov. 18, 1985, at A-8, col. 1 (impose .08% tax on every step of manufacturing process on all manufacturers, regardless of whether they contributed to the waste problem). *But see House Passes Superfund Reauthorization*, THE WEEK IN CONGRESS, CONG. INDEX (CCH) (Dec. 13, 1985) (House of Representatives voted against broad-based manufacturers' excise tax). The House of Representatives and the administration seemed myopic in not expanding the funding base to the manufacturing sector. House and Senate conferees, however, subsequently "agreed on a five-year, \$10 billion program of increased Superfund taxes, with a controversial manufacturers excise tax as the linchpin of the taxing scheme." *Budget Bill Stalls Adjournment*, THE

pool the likelihood of avoiding some of the funding crises that have plagued Superfund is evident. Quite frankly, Superfund's dilemma stemmed partially from the small base of chemical manufacturers that were obligated to contribute to the compensation fund; these manufacturers represented only a small percentage of those entities that may have contributed directly or indirectly to hazardous waste sites and to the environmental exposure problems that ensued.³³⁹

Under the proposed administrative compensation scheme the funding mechanism will implicate all those subject to RCRA as generators, transporters, and disposers of hazardous wastes.³⁴⁰ In addition, all manufacturers of chemicals and chemical feedstocks will have to contribute to the compensation fund.³⁴¹ Although the funding base will broaden, the funding calculus will promote two objectives central to the overall success of the administrative scheme: (1) continued research and development concerning the etiology of toxic-related injuries, and (2) heightened deterrence of actual and potential offenders. Both should, in turn, have the salutary effect of overall risk reduction.³⁴²

More precisely, the funding scheme will use a formula that exacts contributions in direct proportion to the gravity of the risk created. If the nature of the activity is such that the actual and foreseeable risk is extremely high, then that actor will contribute a correspondingly higher amount to the compensation pool. Conversely, the lower the risk involved, the smaller the actor's proportionate contribution will be to the fund.³⁴³ From a policy perspective this contribution formula will encourage a polluter to engage in scientific research to ascertain the nature of the danger, the etiology of the risk, and the precise paths that a toxic or hazardous substance travels to reach the exposure victim. Investing assets to study and resolve unknown, but ascertainable risks should reduce the risks of exposure;³⁴⁴ consequently, a concomitant diminution in the amount that such a polluter must contribute to the compensation fund is only fair.³⁴⁵ In a similar vein, this contribu-

WEEK IN CONGRESS, CONG. INDEX (CCH) (Dec. 20, 1985). The final version of Superfund (\$9 billion) does tax corporate earnings of the manufacturing sector. See *supra* note 34.

339. See Stephan, *Cleaning Up Hazardous Waste: May Companies Be Twice Taxed?*, PREVIEW U.S. SUP. CT. DECISIONS, Issue No. 5, Dec. 7, 1985, at 129 ("Superfund is smaller than was originally proposed (\$1.6 billion rather than \$4.1 billion) and involves a tax on a smaller class of taxpayers (less than 1,000 rather than 260,000).").

340. Consistent with the amendatory provisions of § 7003, 42 U.S.C. § 6973 (1982), the federal imminent hazard action provision, past and present generators, transporters, and owners of or operators of disposal facilities should contribute to the funding scheme. See also *id.* § 6924(u) (further evidence of Congress's intention to broaden the reach of RCRA to past hazardous waste activities).

341. Congress did expand funding sources for Superfund by including the general manufacturing interests. See *supra* note 34.

342. See Note, *supra* notes 2, at 862.

343. For a discussion of the sliding scale concept see *supra* notes 231-38 and accompanying text.

344. Soble, *supra* note 192, at 723 (society should focus its creative energies on abating the unknown, but ascertainable, risks to human health and the environment).

345. See *id.* at 753. "As an incentive to minimize risk, the levy on toxic substances classified in the lowest category will always be zero." *Id.* at 752.

tion formula should also have a deterrent effect on polluters, for human behavior normally strives to attain that level of conduct that will mitigate, not increase, one's liability exposure.³⁴⁶ Thus, favorable response to risk-reducing conduct on the part of polluters will further some compelling and essential policy objectives of the proposed administrative compensation scheme. Such a response will provide an incentive for industry to engage in a research and development program on the effects of human exposure to toxic substances and hazardous wastes and will provide a disincentive for industry to engage in callous disposal practices that create an unreasonable risk to human health and the environment.

Not only is developing an administrative compensation scheme that is an incentive for polluters to reduce the risk of injury to human health and the environment from toxic substance or hazardous waste exposure necessary, but ensuring that the costs of funding the system are ratably borne by both industry and the federal government in a fair and equitable manner is also vital.³⁴⁷ Consequently, the proposed compensation scheme must be configured to achieve this end. Central to the idea of a scheme jointly funded by the chemical and waste management industries along with the federal government is the realization that the principal contributors to the hazardous and toxic substances exposure problem as well as the primary beneficiaries of any risk-reduction effort should share equitably the financial burden of obviating or, at least, alleviating the risk.³⁴⁸ The polluter's obligation in this regard is transparent: if one creates the risk, one must shoulder some responsibility for eliminating or reducing it. The fairness of requiring the beneficiaries of a risk-reducing administrative compensation program, literally every man, woman, child, and living organism in our environment, to contribute to a compensation fund by paying taxes to the federal government is not so readily apparent. After all, this class did not create the risk; in fact,

346. Though human behavior is often unpredictable, the proposed compensation scheme offers a solid analytical approach to deterrence, or risk reduction.

347. To suggest general revenue as a source of possible funding at a time when the nation is in the throes of a \$200 billion deficit smacks of temerity. Other cost-saving or budget-reduction measures should make possible the preeminent goals of this proposed compensation plan without bankrupting the nation. Perhaps the recently enacted Gramm-Rudman budget-balancing bill, The Balanced Budget and Emergency Deficit Control Act of 1985, Pub. L. No. 99-177, 99 Stat. 1037 (1985), is an appropriate step to this end. See *Test Looms on Gramm-Rudman Constitutionality*, NAT'L L.J., Dec. 30, 1985-Jan. 6, 1986, at 5, col. 1 (discussion of the salient constitutional questions lurking within this dramatic piece of legislation). A three-judge federal panel struck down, on constitutional grounds, "the triggering mechanism of" Gramm-Rudman. Stengel, *Back to the Future, Again*, TIME, Feb. 17, 1986, at 22. "But pending an appeal to the Supreme Court, its provisions remain in force . . ." *Id.*; see *Synar v. United States*, 626 F. Supp. 1374, 1377 (D.D.C. 1986) (delegation to Comptroller General violates separation of powers principle), *aff'd sub nom.* *Bowsher v. Synar*, 106 S. Ct. 3181, 92 L. Ed. 2d 583 (1986).

348. Cf. Futrell, *The Environmental Law Institute Study: Statutory Reform of "Toxic Torts,"* in HAZARDOUS WASTES, SUPERFUND, AND TOXIC SUBSTANCES, ALI-ABA COURSE OF STUDY MATERIALS 225, 226 (1985) ("the ELI Study recommends establishment of a compensation scheme financed by a tax on oil and chemical feedstocks for the initial baseline of the fund. The Study also sets up a system for phasing in a hazard fee to replace eventually the feedstock tax as the source of money for the fund. . . . The fund should internalize the external costs of injuries.").

for the most part, its members are victims of it. So why should these people be saddled with any responsibility? Perhaps the answer is not too complex. We are all a part of the same "commons."³⁴⁹ If any threat to the existence of any part of the "commons" is diminished in any way and at any time, then each of us is to some degree a beneficiary.³⁵⁰ Consequently, we may, as a matter of fundamental fairness, have to provide some recompense. Moreover, both the chemical industry and the waste management sector provide products and services of high social utility in which we, the members of society, again principally benefit.³⁵¹ Thus, it seems palpably fair and reasonable that the risk of loss should at least be partially spread throughout society by general tax levies as opposed to letting the risk fall solely on the shoulders of chemical producers and hazardous and toxic waste generators, transporters, and disposers.³⁵² Congruent with the goal of achieving an equitable allocation of the risk of loss, the compensation scheme should be funded in equal amounts by industry, both chemical and waste management, and the federal government. In addition to being reasonably fair this funding proposal provides the financial integrity sorely needed to have a viable compensation scheme.³⁵³

V. CONCLUSION

Proving causation is a key ingredient to the successful prosecution of a toxic tort action for compensation of an exposure victim. Unfortunately, since the typical toxic tort case involves complex questions of law, science, medicine, economics, and public or social policy, no simple solution exists for ameliorating the harsh impact that onerous evidentiary requirements place on an injured claimant. One thing, however, is reasonably apparent:

349. Hardin, *supra* note 247, at 1248.

350. *Id.* According to the commentator, if a threat to the "commons" goes unchecked, the ineluctable consequence will be utter tragedy and destruction. Conversely, if coercive measures, such as taxes, are imposed, then unbridled "freedom" to the "commons" is abridged, averting the tragedy. Ironically, the imposition of this additional tax burden, or any other coercive device, upon the public can be the salvation of the "commons." *Id.* Everyone benefits, therefore, by ensuring that "the environment will never again be a 'free good.'" Kean, *The Environmental Movement in 1985: Between NEPA and 2000*, 10 COLUM. J. ENVTL. L. 199, 209 (1985).

351. Some notable examples of highly beneficial, yet concededly risky, products emanating from the chemical industry are PCBs, which have very good electrical resistance capacity, making them useful components of electrical transformers, methyl isocyanate, which is useful in making pesticides, and dioxin, a waste product of a beneficial herbicide manufacturing process. The waste management sector is essential to society. To understand the importance of waste management, one only needs to ask what would life be like for us if we had no place to store or dispose of our solid or hazardous waste? Life would probably be chaotic and surely would be unhealthy.

352. Under some facts, as a matter of sound public policy, taxpayers of a governmental entity should ratably bear losses instead of requiring a small group of individuals to bear the losses alone. See *Petition of Kinsman Transit Co.*, 338 F.2d 708, 726-27 (2d Cir. 1964) (in a tort case taxpayers of Buffalo, New York, rather than innocent plaintiffs could bear ratable losses more easily).

353. The recently experienced inadequacy and nonavailability of a taxing authority for Superfund is a classic illustration of the desirability of a funding apparatus that ensures the continued financial solvency of a victim compensation scheme.

the common law tort system's causation model is ill-equipped to address the intricate nuances underlying the causation issue in toxic tort litigation. Although tinkering with causation by palliative devices such as alternative causation, enterprise liability, and concert of action offers some relief to a disadvantaged claimant, this tinkering falls far short of the mark in providing compensation to the victim, in deterring the polluter and others similarly situated, and in advancing corrective justice and fairness between the parties. Moreover, this deficiency is exacerbated by the apparent inability of judges and juries to handle capably the esoteric scientific and medical questions that abound regarding the issue of the causal relationship between a claimant's injury and his or her exposure to a toxic substance or hazardous waste. In view of these major hurdles, reconciling the causation element of traditional common law torts with the toxic tort counterpart seems well-nigh impossible and, more importantly, very impractical.

Since the traditional tort litigation model seems inappropriate for addressing causation, a proposed alternative solution suggested in this Article eschews the traditional model's deficiencies and presents itself in the form of an administrative compensation scheme. The objective of this system is not to dispense with a causation requirement; to the contrary, policy considerations underlying the proposed scheme mandate that the requisite causal nexus exist.³⁵⁴ Existing legal notions of the dominant test for this causal requirement, the more probable than not test, however, will not necessarily control; in fact, greater deference will be given to scientific and medical theories regarding the requisite proof of causation as science and law meld together to resolve this intricate question. In addition, the administrative scheme's use of an expert administrative board to decide the causation question will obviate the likelihood of uninformed decision-making. The advantages attendant to using this administrative procedure are: (1) it will produce a multidimensional determination of liability, thereby accurately reflecting the nature of the problem involved, and (2) it will remove this determination from the whim and caprice of unsophisticated, uninformed judges and lay jurors, thus enhancing the likelihood of a reasonably accurate determination. As a result, the proposed compensation scheme will promote a more objective, fair, and precise causation determination. Coupled with the other features of the scheme concerning damages and methods of funding, the proposed administrative compensation scheme will further the principal tort law goals of compensation, deterrence, and corrective justice. Most significantly, however, the proposed administrative compensation scheme will reconcile the causation element and toxic tort litigation, a truly notable feat.

354. The elimination of nonmeritorious toxic tort claims furthers the tort goals of fair compensation, effective deterrence, and corrective justice. Even an administrative scheme, that shuns lay jurors, needs prophylactic measures to guard vigilantly against nonmeritorious claims. The preeminent protection against frivolous claims is a causation requirement. See Huber, *supra* note 302, at 81. "[A] claimant for funds must be required to show causation, if not beyond a reasonable doubt then at least with some serious degree of scientific credibility. An administrative compensation system should be able to enforce this requirement at least as effectively as a court." *Id.*

